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THE POWER OF FORM

BY
R. W. BILLINGS.

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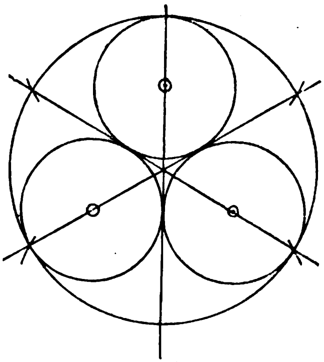

By ROBERT WILLIAM BILLINGS, Architect,
ASSOCIATE OF THE INSTITUTE OF BRITISH ARCHITECTS,
AND
HONORARY MEMBER OF THE SOCIETY OF ANTIQUARIES OF SCOTLAND.

"Keep withynne compasse, so shall ye be sure."

PUBLISHED FOR THE AUTHOR
BY
WILLIAM BLACKWOOD AND SONS,
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PREFACE.

THE Author of this treatise was first in the field to prove, that not only was the whole detail of Gothic Architecture founded upon geometric law, but that the power of design still remained with us, waiting only for its application. In addressing himself to the learner, for whose especial use his labours here are intended, he does not wish for one moment to question the previous knowledge upon this subject possessed by many practised Architects, who must have travelled over the same ground as himself in searching for the primary elements of their profession.

But whatever the knowledge of others may have been upon our present subject, it has not been given to the world, and the Author's claim holds good as the originator of the conjurations embodied here and in other works, and which, like all sleight-of-hand tricks, are very easy. In short everybody can do them—that is, when they know how.

The general circulation of works on art has been limited by the high price demanded in return for costly production, and thus their general good has been all but lost, because their purchase has been beyond the means of those for whom they were intended. In extenuation of this unfortunate position, it must be admitted that, unlike the works of writers,

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their expense is not limited by merely transferring the labours of the brain to the types of the printer, for there is drawing, expensive engraving, and the great cost of printing from copper or steel plates.

For the first time, during a career of some experience in the publication of architectural works, the producer has changed his tactics, to meet, if possible, the case he has stated. His drawings have been engraved on wood, by his friend Robert E. Branston, whose known ability, both as an artist and a man of business, needs no eulogium here.

The cost of wood block engravings is upon a par with that of plates; but here all comparison ends; and the mere question of paper and print has enabled the Author to place the results of his labour within the means of all who may be interested in the principles he has endeavoured to embody.

And thus his volume, possessing possibly as much novelty as many romances of the day, is produced with all the cost of illustration, at a less cost to the public than is usually made for a single volume of that class.

St. Mary's Road,
Canonbury, London.
January, 1851.

To the Student, in his just desire to cultivate the Art of DESIGN, and to those whose hands fashion the creations of the Artist, a new series of leaves upon one of its branches cannot fail to be of immediate interest; and, were the motive power of Art unanimous upon its advance, our preliminary Essay upon the illustrations comprising the present book, would be necessarily short—our road would indeed be pleasant travel, for we should be sure of a reception as the possible contributor of new stores to its ever varying wants. But we have, unfortunately, to regret that there is a class, and that a very numerous one, who act in all matters concerning Architecture, and the Arts subservient to it, as though every thing had been accomplished, that nothing remained for the present or future ages of Architects and Artists generally, but to be continually jumbling together the productions of their forefathers, and then to dignify them with the title of Designs. We can thus fancy the dismay of our mere "antiquity-lovers" at the announcement of an extension of the field of design, entered by means of that which is known as the Gothic style.

Opposed to the negative state of art we have described, and protesting most emphatically against the fettering, nay, of absolutely staying progress in any branch of knowledge by slavish adhesion to mere precedent, we venture to place before the world a production, claiming (although by merely playing with compasses), that much to be desired qualification, originality. Fancied inventors of a theme are generally enthusiasts upon their subject, and doubtless the Author of the present attempt will be pronounced one, when he ventures to describe it as the re-opening of a shaft to the mine of ornamentation, which at the very surface has pierced a vein it will be indeed difficult to exhaust in the working. Nay, in the experience gained by practice, he goes further, and asserts the impossibility of accomplishing such a task; for to the skilled artist there is no more difficulty in exhibiting new combinations of form than is experienced by the musical composer in producing changes of sound, or by the arithmetician in varying the power of numbers.

It may be repeated, that there is no real difficulty; and further, that an advance as palpable as its hitherto admitted retrogression, would have been made in Architecture, as time has produced in other Arts, had the forward movement not been stopped by that extreme veneration for antiquity, which has reached such an absurd point, as to declare all progress at an end—that the modern race of Architects are only to retail the wealth already created, and not to gather for themselves fresh stores from the ever increasing fields of knowledge. It is fortunate, however, for Art, that there are other classes, deeply interested in its progress, and it is to them we would address the few words elucidatory of the object of our work, and by way of introduction to the Designs, which can be read without the aid of any very voluminous essay. Indeed, it may be fairly asked whether they require an essay, for their true reading is arrived at by the mere use of a pair of compasses.

The more we examine the powers of Design developed by the aid of *fixed diagrams*, or foundations, the more absurd does it appear, that ever since the revival of Gothic Architecture we should have gone on for ever copying—taking it for granted as a preliminary that all possible combinations were exhibited in the works of our predecessors; considering, in short, that the mine was exhausted, that the works completed some hundreds of years since were a "finality," when in fact, and notwithstanding all that the ancient Architects accomplished in the field of decorative design, they scarcely explored its boundary, while the vast and unlimited space lying beyond is still untrodden. So great, indeed, is the power of this mechanical field of Art, and so simple its cultivation, that it is absolutely easier to produce new combinations than to copy old ones. Of this fact there can be no doubt, and any Artist may prove it by the most cursory study of the subject; but beyond the mere saving of absolute labour in production, and far above the mere credit due to the most exquisite copy, there is the satisfaction and the pride all men should feel when they have produced an original instead of a repetition, and this, by simply adhering to the same unerring laws of truth which guided the medieval artists in their productions.

Every eye admires the wonderfully elaborated screen-work, the gorgeous windows of "airy tracery," (whose fragile appearance would almost seem to contradict an existence of centuries), the intricate network enveloping many of the magnificent towers of the Continental Cathedrals, and in some cases those of our own land; and why should we not inherit the spirit which animated their Architects? There is no mystery about the matter, for all are designed upon the most simple of geometric laws, as palpable now as they were of old. Shall we not therefore be permitted to make use of these laws, when it is known that combinations innumerable may be produced? Shall our original designs not be allowed to stand on their own merits side by side with the emanations of our forefathers?

We advocate the extension of knowledge by their experience; we urge the attainment of their SPIRIT—but while admiring beyond measure their beauties, we protest against mere copyism of their works, as fatal to progression in Art, and as rendering the would-be Artist essentially a mechanic, whether he be a Painter, a Sculptor, or an Architect. Painters do not permit the admirers of pictures to reduce their art to this degraded state, neither do Sculptors rise as mere adaptors of former works, or, speaking plainly, as mechanics—why then should the professor of the noble art of Architecture (without whose protection not one of the sister arts would be able to preserve their productions), be chained to slavish imitation of the buildings of his ancestors, or be prevented from soaring to a higher pitch by the dogmas of amateurs, who can at the best obtain but a smattering of that art whose alphabet is, unfortunately, too easily comprehended, whose general form of words is too easily recognised, but the profundity of whose language is proved daily by the lack of originality and signal success, in the productions of its most deeply learned Students. It is time, indeed, that a change came over the spirit of the dream, and surely nothing in this age of progression will raise the Architect but the production of original works. He must, in short, prove to the world, that if in some cases there is truth in the olden rhyme—

"By line and rule, works many a fool,"

the opposite and more recent adage is applicable to him, which states in answer that in the composition of such fools the wise man predominates.

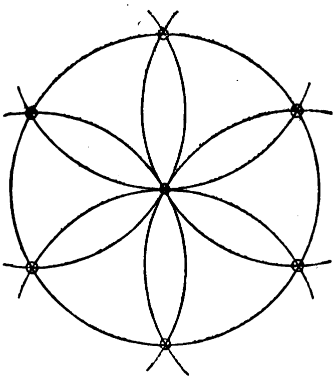
Independent, however, of the baneful effects of influence from without, there has been a division in the camp, perhaps more fatal to Architectural progression than the cause stated; and although the non-progressive feeling is greatly changed by the spread of mechanical knowledge, it is deeply to be regretted that many of our Architects, while admiring the multifarious designs of medieval art, have declared that they were the result of mere chance, little dreaming of the mischief they were inflicting on their art. Chance, indeed! It had no more to do with design than it has now, and the sooner the notion is utterly discarded the better, for it is only by admitting at once, and without reservation, the fact of mechanical foundations, that we can ever rise to the creative power,—to that point where the mechanic ends and the artist begins.

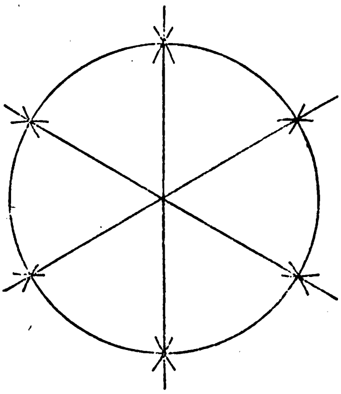
Briefly then, but forcibly, we may ask, what is among the chief merits apparent on the face of all the great *compositions* of the old Masters in painting and sculpture?—that quality requiring to be attended to before they dared to attempt the finish of their works! Is it the existence of a particular geometric figure, or leading line, or is it otherwise? Has the existence and repetition of the triangle, the circle,—the ogee, or line of beauty,—the radiation of lines and curves,—or the wonderful adaptation of mere vertical or horizontal lines in their pictures, and their sculptured groups, nothing to do with the merits for which the world unconsciously admires them? There is no possibility of giving more than one answer to the question, and that is, their undoubted foundation upon principle.

If it cannot be denied that geometric laws are evident upon the works of the painter and sculptor, we may fairly ask the objectors to their existence in architectural design, if the common trefoil or quatrefoil of Gothic Architecture is or is not Geometric? Let any man who fancies the contrary, try to form them without the aid of compasses, and he will be speedily undeceived. Do the adversaries of order for one moment doubt that the pointed arch of architecture is formed of the arcs of circles? They may just as well repudiate the existence of the equilateral triangle, from the points of whose base the first pointed arch was struck. As well might they question the circular form of arches, general previous to the introduction of the pointed form; we say introduction, for its origin is coeval with the first existence of geometry, and founded upon that figure whose perfect form has been for countless ages used as typifying the unity of the Trinity.

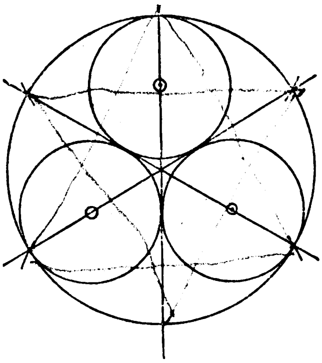
Let the unbeliever in this matter go to any freemason and ask, if the equilateral triangle has anything to do with his secret knowledge? Talk of working the forms appertaining to Architecture, by rule of thumb, that is, by hand, and without the aid of geometry, forsooth! It would be just as absurd, just as unreasonable, to ask the artificer to produce good masonry without the use of the square, or the plummet and level. The mechanic would have too much common sense to attempt such a gross breach of practical knowledge; and surely if this be the case, those who claim to be his superior as artists, should at once and for ever discard the error.

The diagram chosen as the foundation of our work, contains perhaps more than any other geometric figure the power of variation, and we have by no means exhausted its fertility of change. Nay, we can hardly be said to have fairly opened out its vast, its endless, powers of combination. In its primary form it will at once be universally recognised as the kite star of the schoolboy, the very first geometric figure the child produces when playing with a pair of compasses, by simply striking the radius of a circle round its circumference.



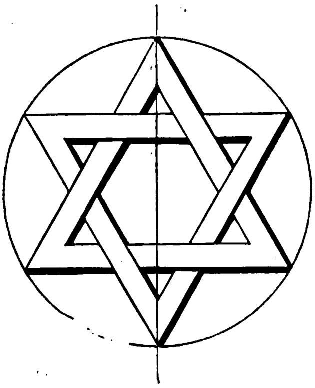


In its second form, by the lines cutting through these points on the circumference of the circle, and passing through its centre, we have the skeleton of our diagram, thus :—

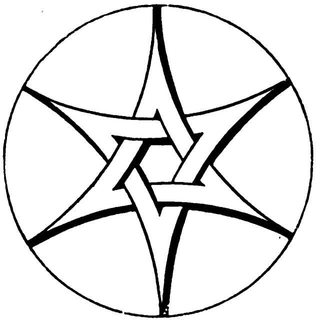


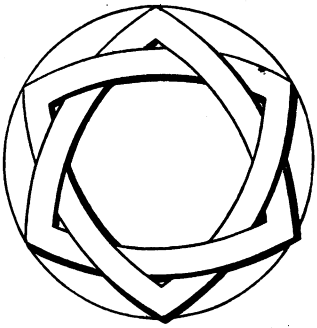
The third form is the perfected figure upon which our designs are produced. It is simply the introduction into the previous figure of three equal circles in contact.

We have a most remarkable coincidence, and matter for the consideration of the learned, when we reflect that the very first geometric figure, formed intuitively by the child in playing with a pair of compasses, marks in its progress a diagram, known to the initiated as embodying the

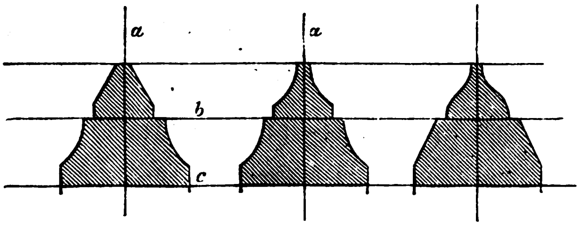


profundities of masonic mysteries. The perfections of this figure need no description, for they are evident to the most uneducated eye—but we may remind the reader that whether we regard it as formed by lines or by curves, and whether these are represented as convex or concave, the crafty symbol patent over the whole world, and during all time, still remains the same. Our illustrations here are sufficient; but the reader who wishes to investigate this matter further will find it fully treated of in the 7th chapter of the fifth book of Vitruvius.

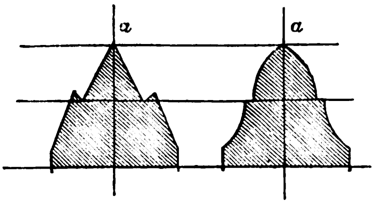




To those who have the knowledge of architectural detail, our diagrams and their results need no particular explanations, but to the uninitiated it may be necessary to state, that the actual diagram, or skeleton pattern, exhibited upon the succeeding pages, does not appear in the completed pattern, being a primary central line (*a*), used merely as a key for placing the expression of mouldings upon it. So



soon then as the result appears this foundation line is removed. We give the sections of mouldings applicable to our designs, for all the varieties will apply correctly as outlines, although the light and shade, from the variety of contour, would be very different. There may be, however, forms of mouldings in which the central or projecting line of the diagram appears—that is where the upper member comes to a point, thus. In particular situations this form is effective, but generally speaking the fillet on the top, or nose, as it is commonly called, is by far the most pleasing in its results.



After forming the lines of the diagram we proceed to those indicated by the section, above the line *b*. These generally run unbroken, through a composition as a *framework*, while the portion below (*b*, *c*), is continually separated into minor detail. It is indeed to this beautiful arrangement, to this exquisitely simple combination of primary and secondary forms that medieval architecture owes the peculiar charm—that projecting and recessing of parts which distinguishes it from more recent examples, as essentially containing the elements of the picturesque. And it is the absence of this quality which marks so decidedly the failure of nearly all modern attempts at imitation.

In a former work* upon another branch of our present subject it was stated that the object was "to carry one diagram to what would appear the possible limits of its varying power." This diagram is here exhibited, and it may be briefly stated, that the power of variation exists principally in the enclosed spaces lying within the large circle, and between the four smaller ones contained within it. Now, if we enlarge the enclosed circles these spaces become contracted, and so does the power of variation. As we carry out this principle of enlargement, the field becomes smaller, until at last when the circles nearly touch each other, the power of production has fairly ceased, for it is only a few peculiar combinations which are then producible. At least, this conclusion is the author's result.

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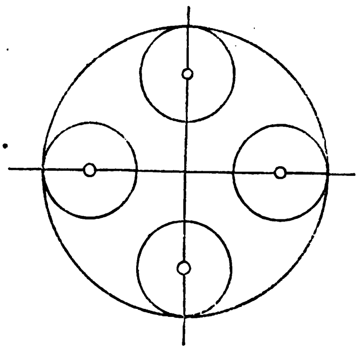
* "The Infinity of Geometric Design, by Robert William Billings." William Blackwood and Sons. 1849.



But carrying the experiment further, a result is given totally differing from the conclusion just formed, for no sooner are the enclosed circles made to come in contact than a new and even greater power appears than that of our first essay, where, as we have just stated, the circles were disconnected, and to this circumstance may be traced the origin of the present series. As in the first series, the secondary foundation of design in combination with four circles, was necessarily the square, or the octagon, (two figures agreeing in numbers with the primary diagram), so in the present effort the secondary form, in connection with the three inclosed circles, is the equilateral triangle or the hexagon. Now, every geometrical figure numbering upward will be found, upon the most cursory trial, to contribute its quota to this most easily accessible field of design, of this inexhaustible mine of linear development.

The truth of this general statement cannot be doubted, but of all geometric forms, the triangle as a foundation for design possesses greater power of variation than any other figure. Speaking of the circles here placed in connection with this primary form, we simply state, that the power of the combined diagram is materially contracted by them, and by the larger circle enclosing, the whole. Thus there is frequently great difficulty in varying the small central triangle formed by the junction of the enclosed circles, and a still greater difficulty in conquering the monotony of the spandrils on their outer boundaries; for it must be remembered that the task we have proposed, is, in every design, to retain distinctly all the enclosing circle, and all or the greater part of those enclosed, in order that the same framework may be distinguished amidst the various expressions of form arising from a common foundation.

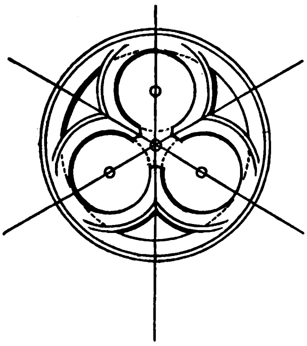
Most extraordinary it is to watch the changes produced by mere expression, for although the same skeleton appears in our whole collection, nothing can be more different than the results. It is, in short, with Tracery as with the human face, and even lower in the scale of animal life. Every human face has the same features in common, but what a field of contemplation—what wonderful variety does the mere difference of individual expression present to us, even if we confine our observations to members of the same family.

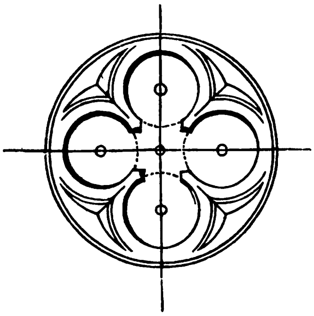
They are, in fact, so many different designs, and woe to the race of portrait painters were this state of affairs to be changed. Let the disbeliever ask any shepherd if he does not know every one of his flock by their facial differences? We claim then for the patterns in our work, that the variation of design upon the same diagram may be regarded as so many modes of expression, or in fact as so many varied faces having the same bones.

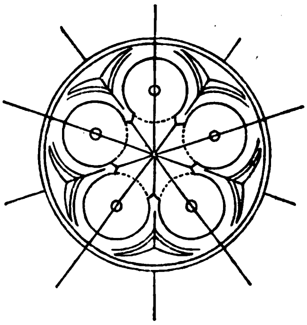
One glance at the collection of designs here presented will convince the observer that none of the ordinary figures appertaining to Gothic Architecture have been used, excepting indeed as perfectly subsidiary to the general form. Thus, under the head of what has been usually termed design, the three circles of our diagram might each have been filled with a trefoil, a quatrefoil, a cinquefoil, and so upward in number. Then, again, each of these figures might have enclosed a foliated or other ornamental boss in their centre, and the spandrils might have been varied to an interminable extent by objects from the animal and vegetable kingdom. But all these have been purposely avoided, in order to prove the amount to be accomplished with mere tracery, (a subject once supposed to be perfectly exhausted), if we would but believe in the capability of producing new combinations.

Foliage is here spoken of, as subservient to Tracery, but foliated design upon geometric foundation was in extensive use centuries before the invention of Gothic windows; and that luxuriant display of form which has given such imperishable interest to the buildings of the fourteenth and fifteenth centuries, was merely an offshoot from mechanical foliation, being literally branches without leaves. But in our present effort, (intended only to facilitate the student in the use of mechanical principles) it was determined at starting to adhere strictly to mere framework, leaving all attempts at leafwork utterly out of the question; for as yet the world is hardly prepared to admit even the geometric origin of Tracery, much less of the ornamental leaf work of Architecture, although their originals,—the very flowers of the field, have been impressed with this perfection of form by the hand of the Great Creator. Let the sceptic examine the simple daisy, and if he be not convinced, then let him turn to the perfect geometric radiation of the cells of the sunflower. They are only equalled in geometric perfection by the hexagonal cell of that most industrious insect architect the bee.

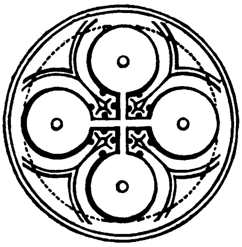
The leafy origin of Tracery is undoubted, and is proved by the terms of its own detail, for what are its projecting ornaments or points called? They are trefoil, quatrefoil, or cinquefoil, that is three-leaved, four-leaved, or five-leaved, according to the number of circles used in their formation, as the accompanying figures testify.







In some examples these points or foils are (by the close proximity of the circles) very thin. But, numberless ancient specimens prove, that when the circles are smaller, and, consequently, more apart within the space occupied by the whole figure, the points become broader. When this occurs they are frequently cut into the form of leaves, thus becoming what their name actually implies.



The mechanical practice of form is always important to the artist, because it makes him familiar with the correct manipulation of detail. And if his knowledge on this head becomes ultimately secondary to effect, it should precede it, for all works of art should bear examination in respect of absolute correctness. If this merit be wanting, they are indeed valueless, excepting for mere show. Were there no other advantage gained by the practice of mechanical design than the habit of calculation, or the methodical spirit which it engenders, it is maintained that these would well repay both the artist and the workman.

But there are other considerations, and among these, especially to the Architect, the study of the geometric ramifications of Tracery is the key to the restoration of ancient examples, of which time or wanton destruction has but too frequently left us hardly so much of the skeleton as would enable an architectural Cuvier to decipher and declare the order. We may instance the numberless ruins of ancient Churches, of whose once gorgeously traceried windows nothing now remains, save the stumps of their severed branches. Yes! to the initiated in the knowledge of geometrical design these shattered fragments are bones sufficient to declare the skeleton,—they are the leaves through which the whole book may be read. By its means the studies of the Architect may benefit art, and create a new fame for his predecessors, by rescuing their works from oblivion.

The collection of Designs following this introductory Essay may be regarded as experiments merely elementary, upon Tracery, whose framework, by the aid of mechanical diagrams, can be reproduced by any one capable of handling a pair of compasses. Nevertheless, they are not without interest to those more advanced in art, as solving much of the apparent mystery which until recently enshrouded the ramifications of a principal ornament in Gothic Architecture.

In a large number of Designs, where each bears distinctly a common foundation in the result, it must not be expected that all the combinations can be equally successful. It is frankly admitted, that some are peculiar, and others may be called even by a harsher name—but if the case be so with the present series, it is equally so with many examples having only antiquity to recommend them. It is not to be expected that every human face shall be regular in feature, or what is termed *pretty*, but there may be a quality very far superior—there may be the *beauty* of expression, marking without doubt the lasting triumph of mind over matter.

Our present attempt is presumed to be so many variations upon the same amount of material within the same space, that is to say, it will generally be found that each design has nearly the same number of spaces within an unvarying framework. It is necessary to state this, as a reason for the absence of still greater changes than we have shewn, for by multiplying the number of openings within a given space, or by reducing them, we should in either case be walking into another field of design.

No difficulty can occur to the student in delineating our productions, because each design has its geometric diagram placed upon the opposite page, with the curves and lines of which they are composed, numbered in the order of formation, and the *pons asinorum* of Euclid thus needs hardly to be passed in order to comprehend their formation. Following these diagrams successively, the student will find that the mere delineation of one subject gives the clue to other designs; and so rapidly do the suggestions of varied combinations press one upon another, and, apparently, almost without mental effort, that the subjects may almost be said to come to hand ready designed.

The application of a principle is surely no part of an author's business. It is fit occupation for those directly interested in the various productions or manufactures to which his raw material may be made subservient, but as it is possible that the author of these productions may again be asked the question, "Cui bono?" he deems it right to say a few words by way of anticipation. He might, indeed, shelter himself under the plea of the value of any original contribution, be it ever so humble, to our stores of knowledge; but there is not the slightest occasion for this unanswerable argument.

Briefly, then, his wish is to aid in destroying that endless repetition which disgraces our modern buildings, expressed sarcastically as the 'artificial infinite,' by proving that we have the power of producing the reality of infinity. Supposing, (contrary to all modern practice) that a great building had to be erected, in which every window, and every ceiling, the doors, wall decorations, screens and furniture, required not fifty, but fifty thousand different designs, they could be produced by the aid of fixed diagrams. Thus we have only to travel from the question of tracery, to take its framework as branches, and then fit upon them the leaves and blossoms of the vegetable kingdom. There will be found the number at once, each and all merely depending upon the ability displayed, as to whether they are or are not to be classed as works of art.

Suppose, again, he recommends the application of his designs to ornamental castings of all kinds, or even the adaptation of their principles to the framework of all kinds of machinery, for the flowing forms of medieval art can be far more easily adapted to any change required for strength, than the set laws of classic architecture; and besides this reason there is the desirableness of cultivating our own nationality in art. Or turning to matters of ordinary life, let us ask, Why should not a good circular geometric pattern be as applicable for the decoration of a common plate as that most extraordinary and far-famed willow, or Chinese pattern, whose chief merit is, that it contains more errors of Drawing than those intentionally displayed in Hogarth's equally celebrated delineation of Perspective Improved?

Objectors to works upon Architectural principles start up at every point; every step taken to elucidate them is at once considered an innovation, rather than an advantage, and strangely enough, the enunciators are received with marked suspicion, as though they had some hidden motive, some undefinable and selfish object in view, rather than the desire of bringing forward a simple truth. Amongst other defects attributed to the present examples it has been asserted that the designs were made first, and the diagrams then fitted to them—equivalent to the absurdity of saying, that the manufactured article could be produced before the raw material was provided. But, to be serious, we may at once affirm, that the results of Nature's operations are displayed in the most beautiful patterns, and these cannot be delineated with certainty without fitting them to a geometric diagram, whether we instance the rainbow, the honey-comb, the flowers of the field, or the star-fish of the deep.

Further, let it be asked, where has our still increasing store of knowledge regarding the principles of architecture sprang from, if it be not from the mere fixing of diagrams, which the result of investigation has proved to belong to ancient exemplars—which the patient searcher has proved to be the title-deeds of those vast estates of art we now possess, but whose descent to us is a mystery; for the secret working of the ancient freemasons, once patent all over Europe, (as the universality of their productions declare), was utterly lost during the period of the Reformation, when the glare of new light, emanating from the lamp of religious freedom, effectually dimmed, if it did not utterly extinguish, the glimmering taper of architectural knowledge.

Perhaps enough has been said to answer the objection alluded to; but there is another not yet stated, which affirms that the designs belong to the kaleidescope,—a term utterly inapplicable, unless indeed the power of reproduction may be said to equal that machine. Kaleidescope designs or patterns are purely mechanical—they are either so many sectors of a circle, or else so many radiations from a common centre; and a glance will convince any person with the slightest knowledge of Geometry, that the present Designs are not at all of that class.

Supposing, for the sake of argument, it be admitted that they were first designed, and then reduced to a geometric principle or calculation, it is after all only the minor parts to which the observation can possibly apply, for all are based upon one unvarying foundation; and this compels an adhesion to geometric law, from which there is no escaping in the general result.

ORDER, in short, is the FOUNDATION whence they originate, and the PEDIMENT in which they terminate.

Illuſtrations.

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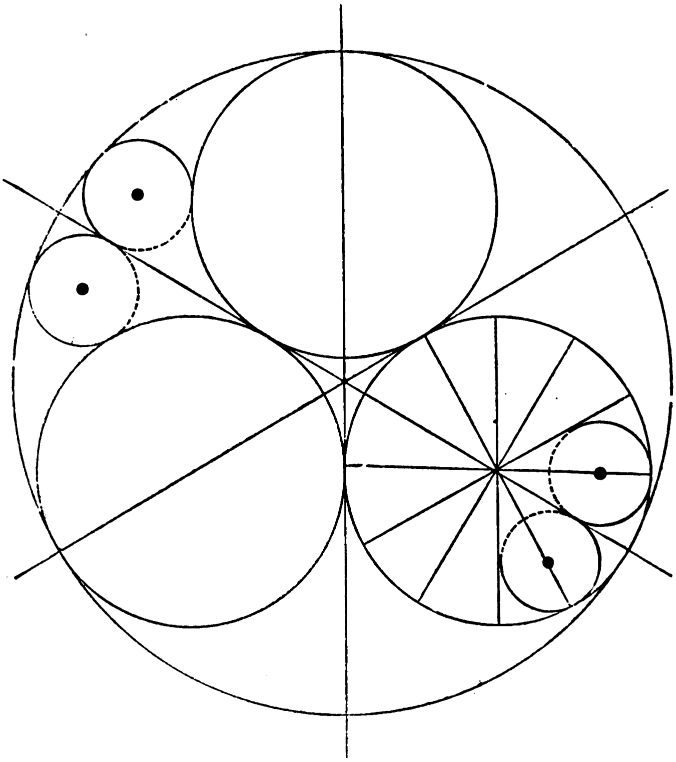

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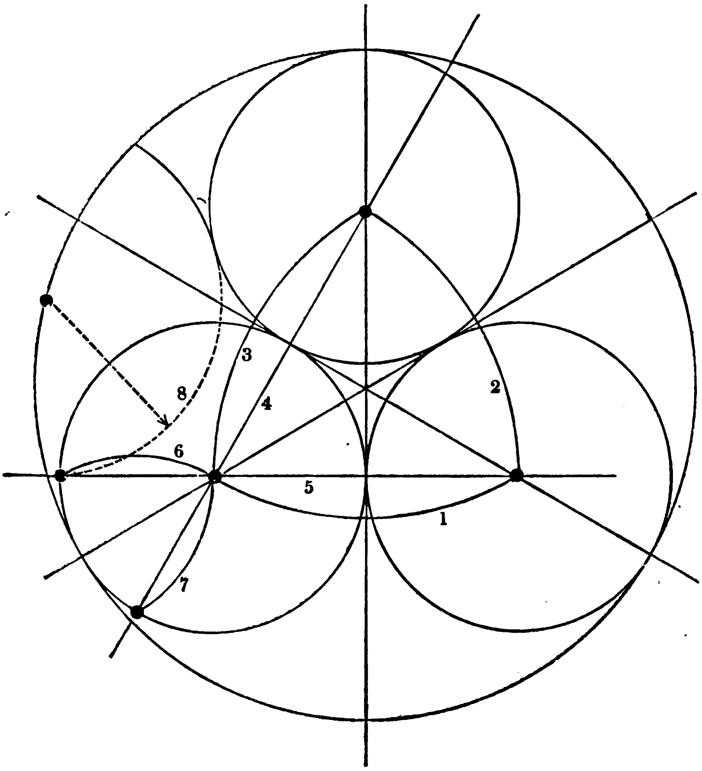

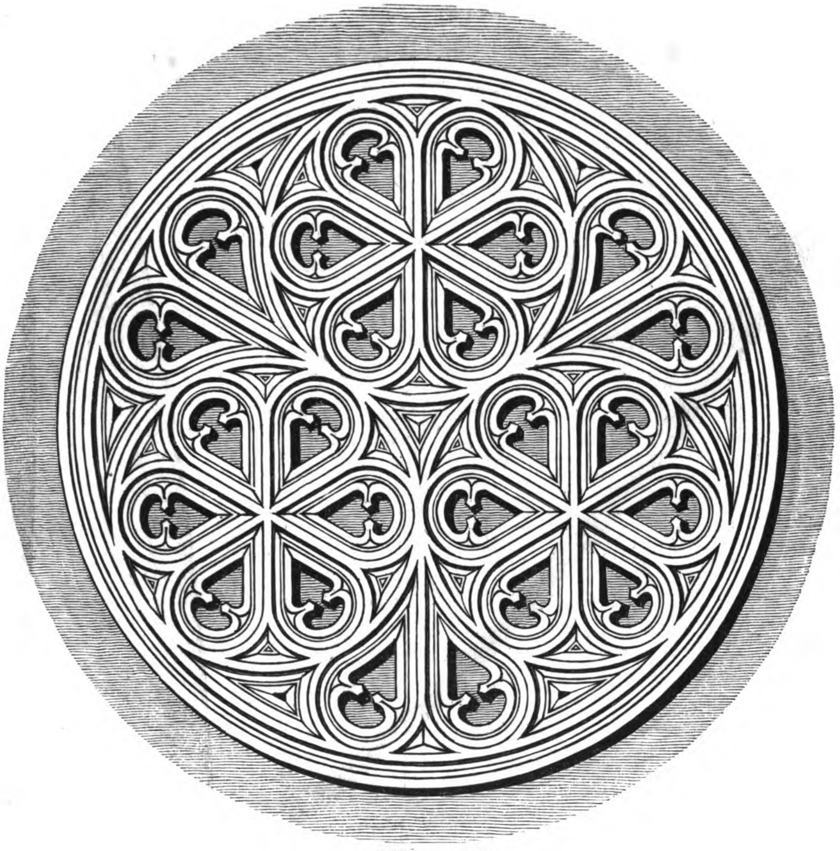

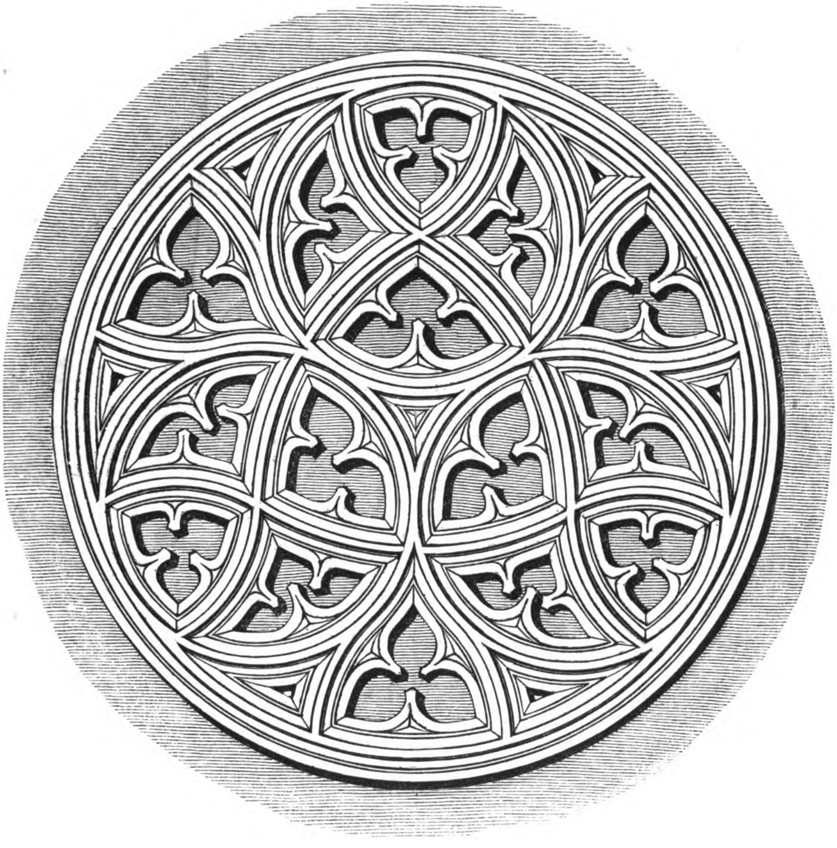

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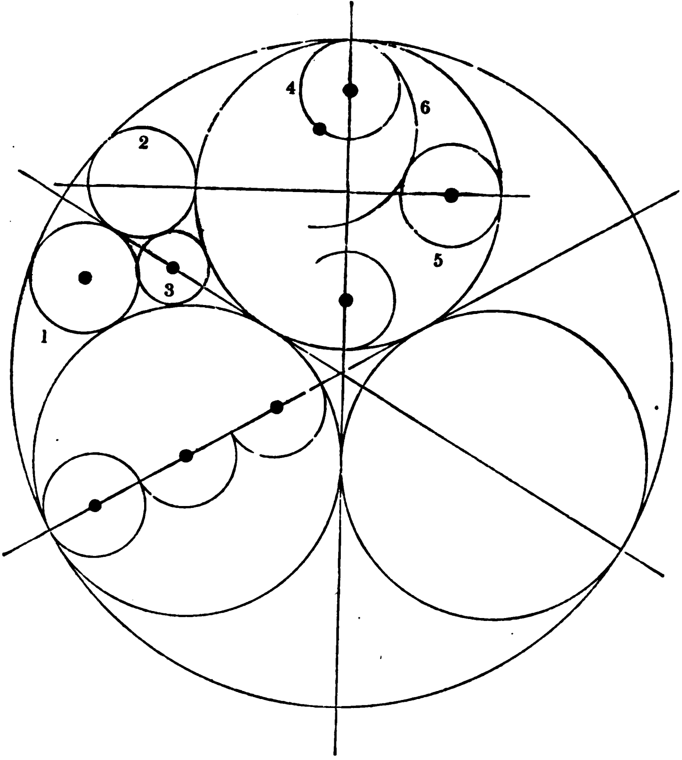

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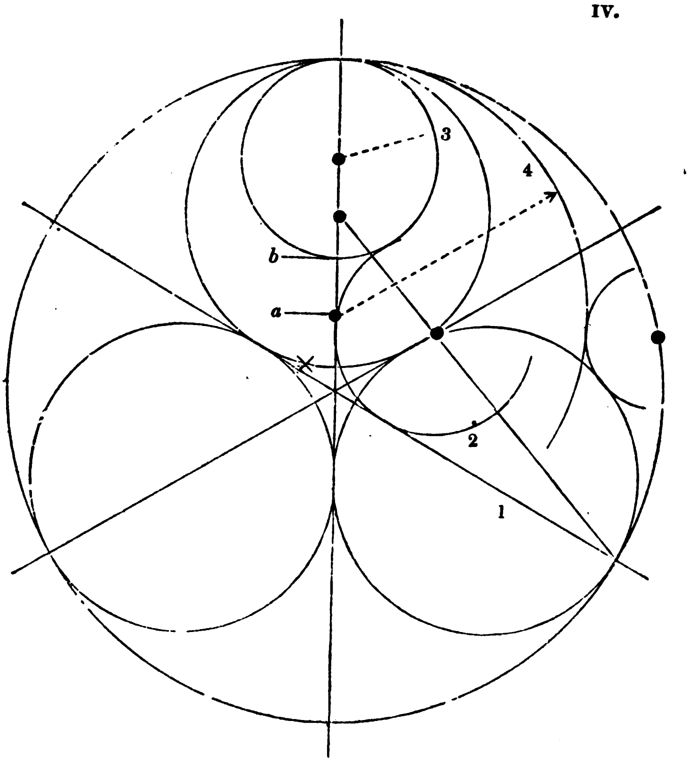

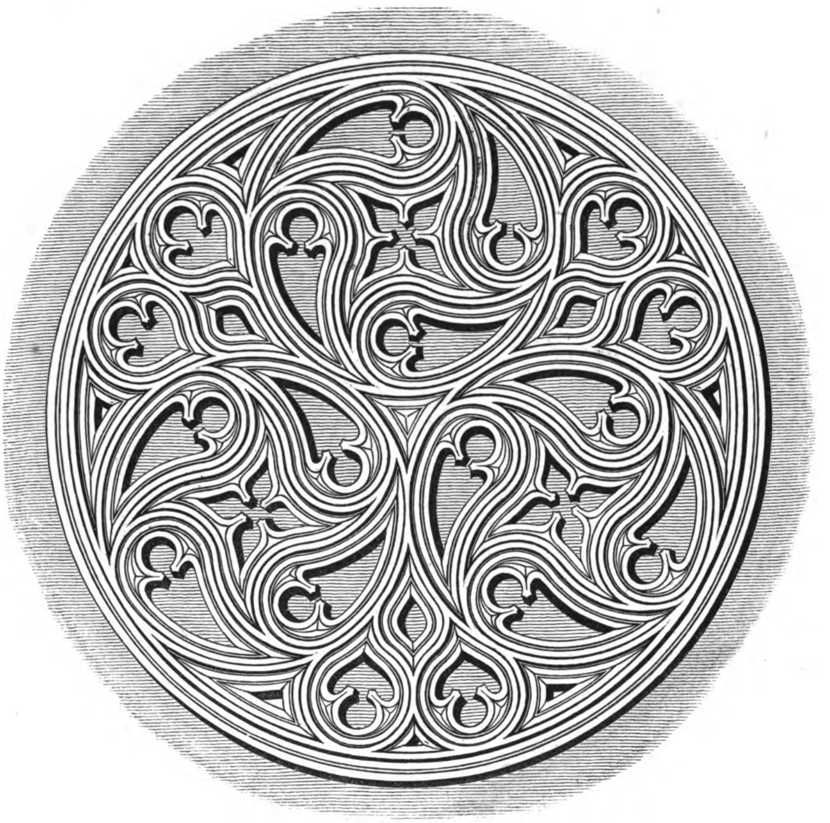

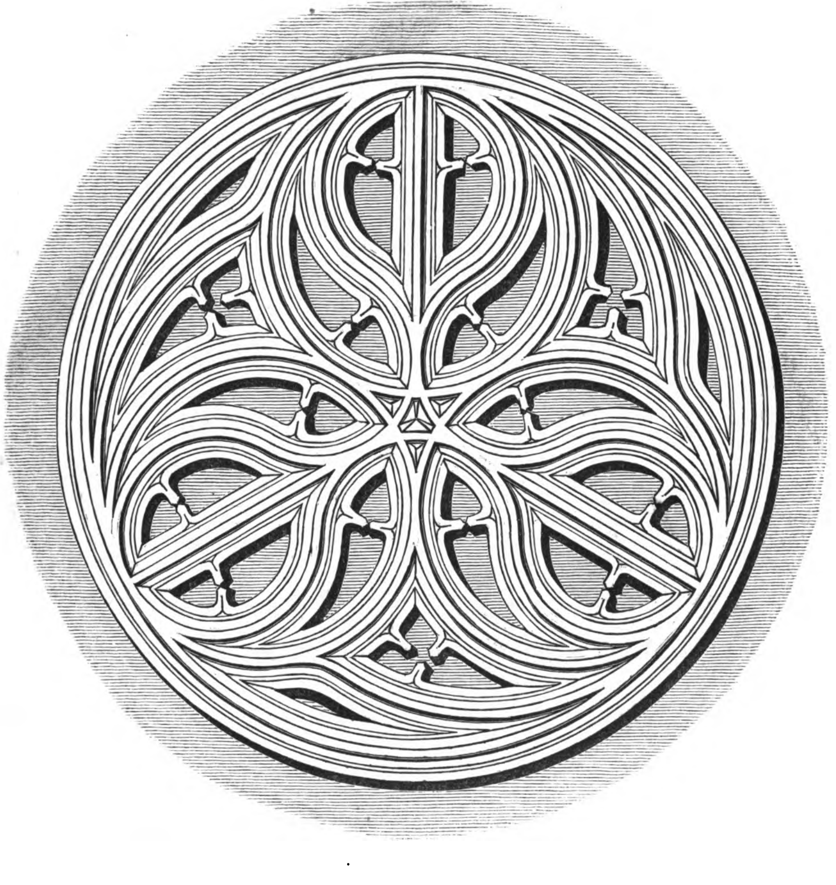

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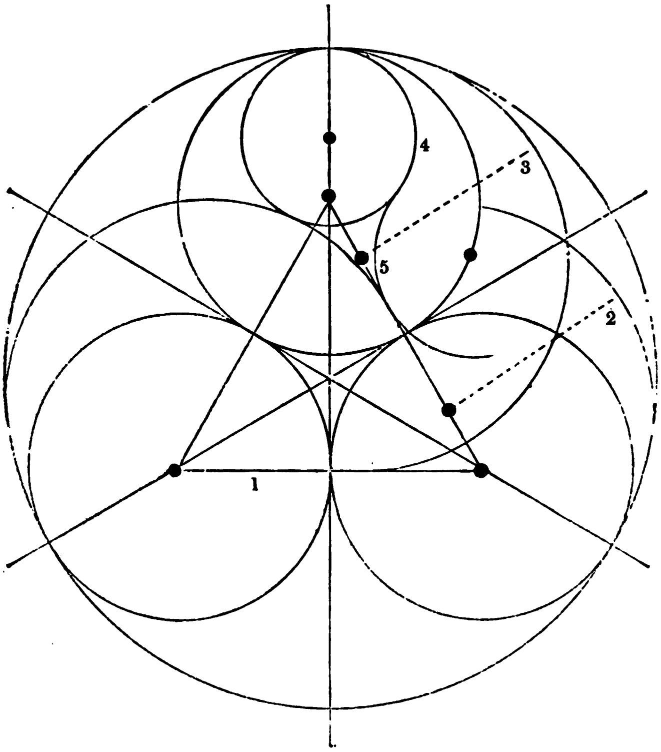

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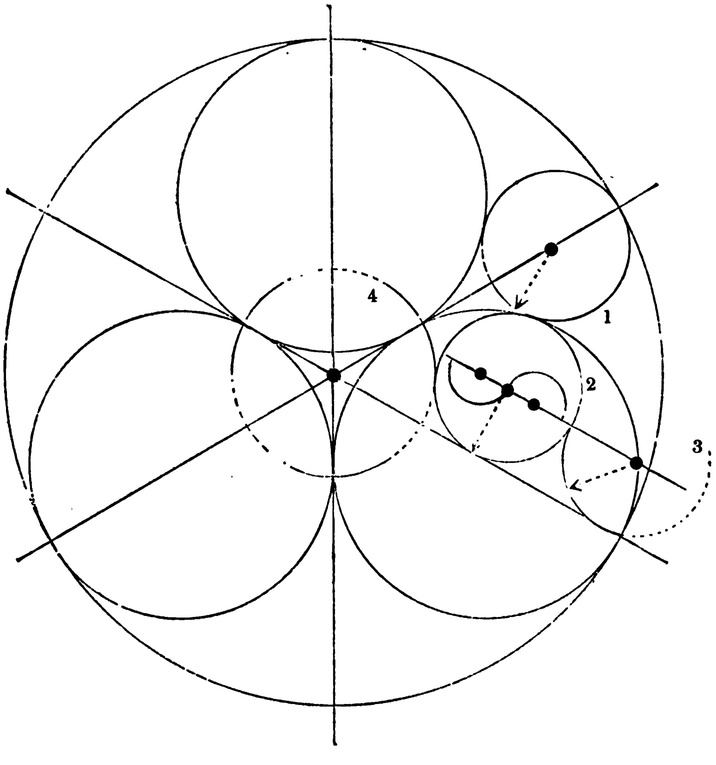

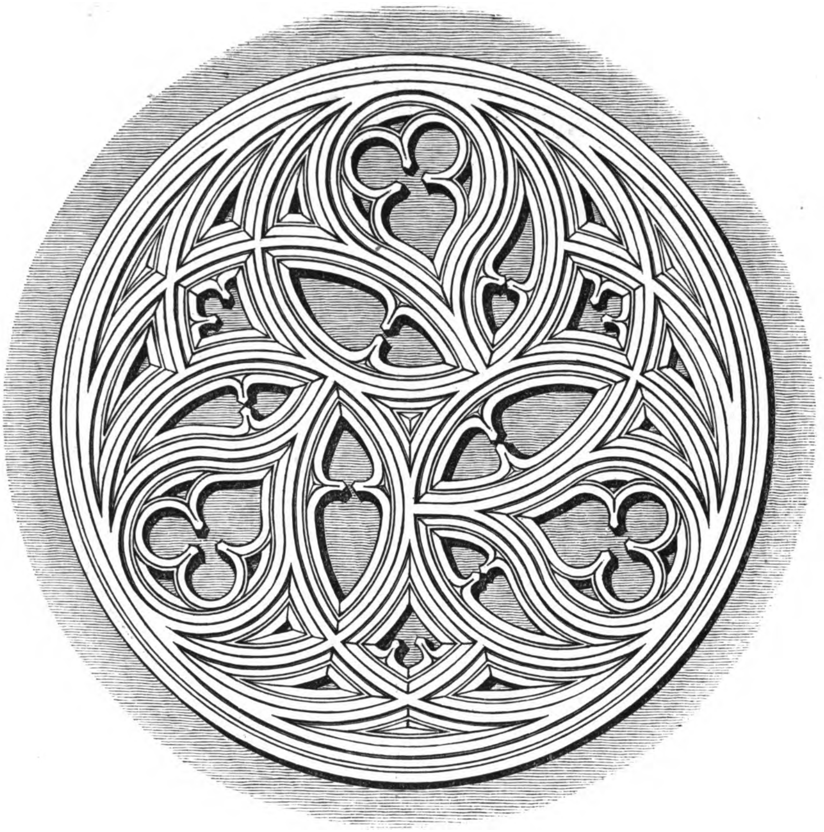

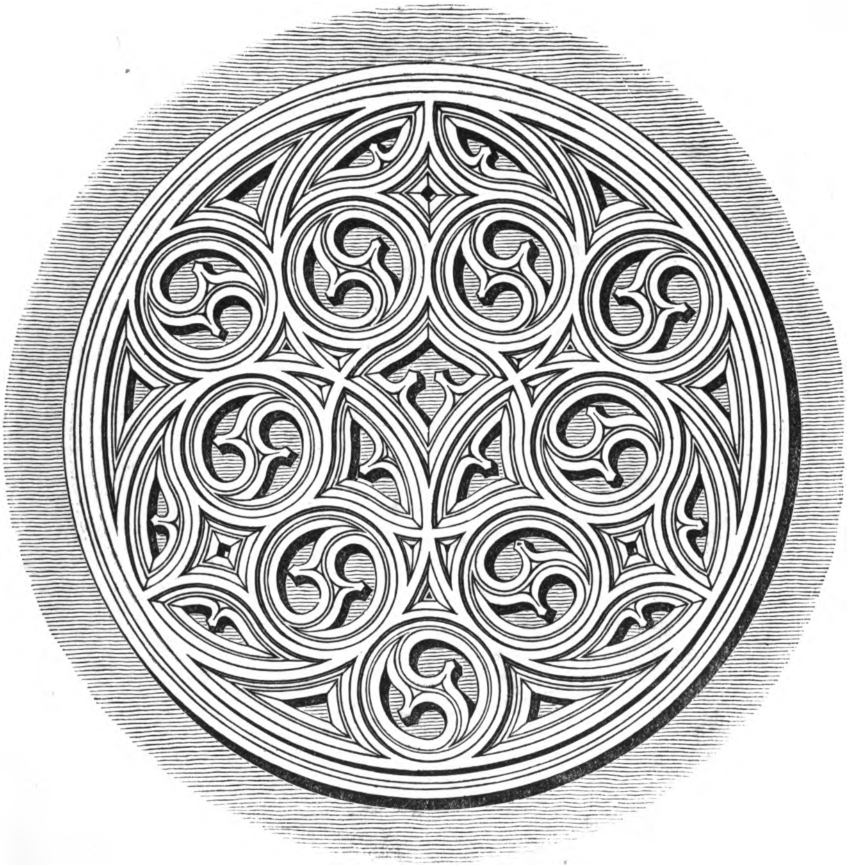

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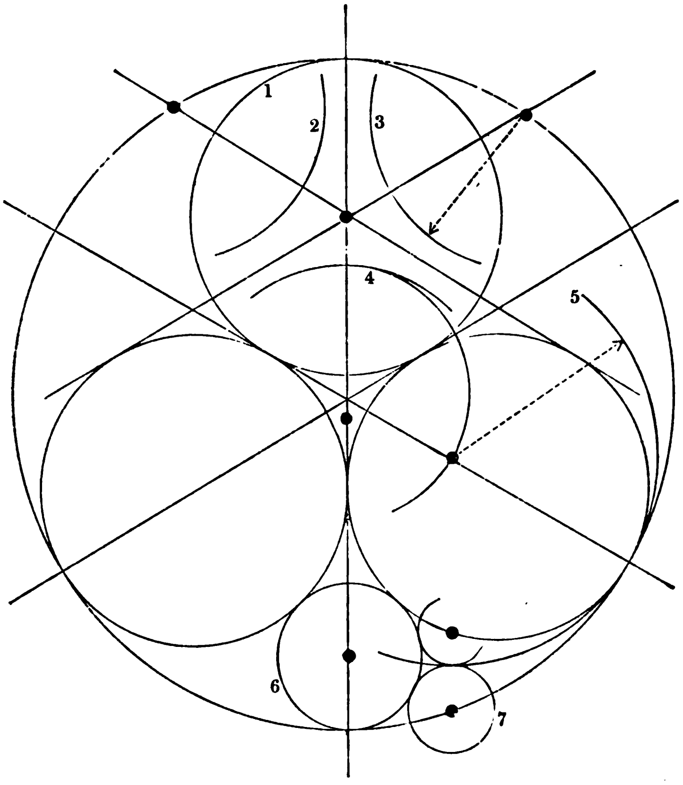

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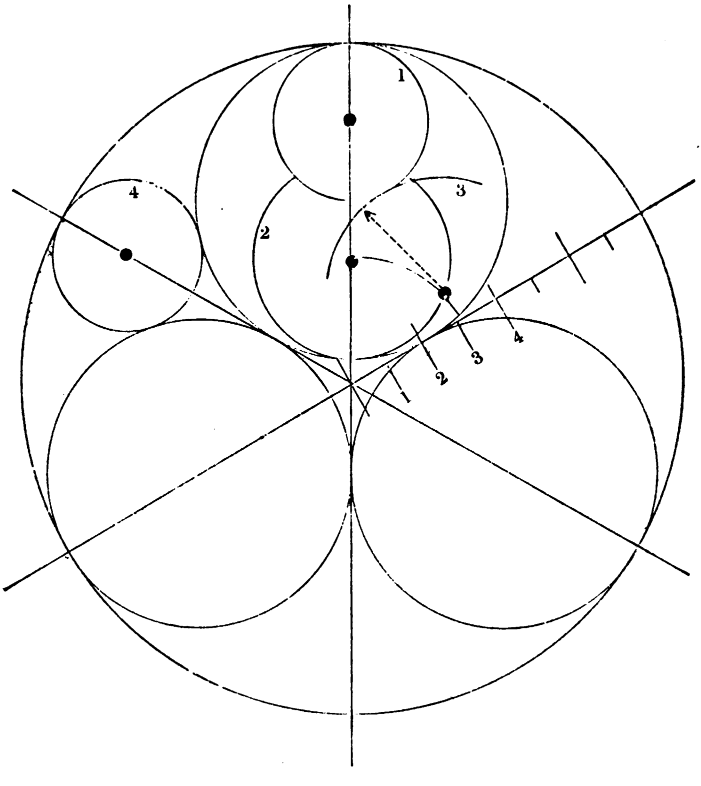

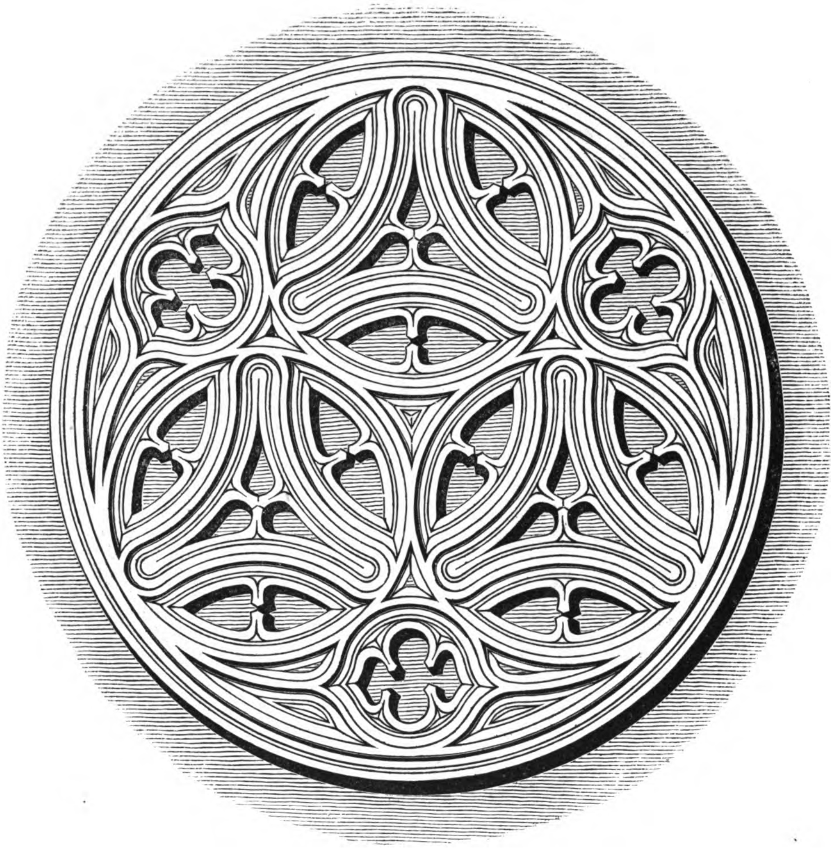

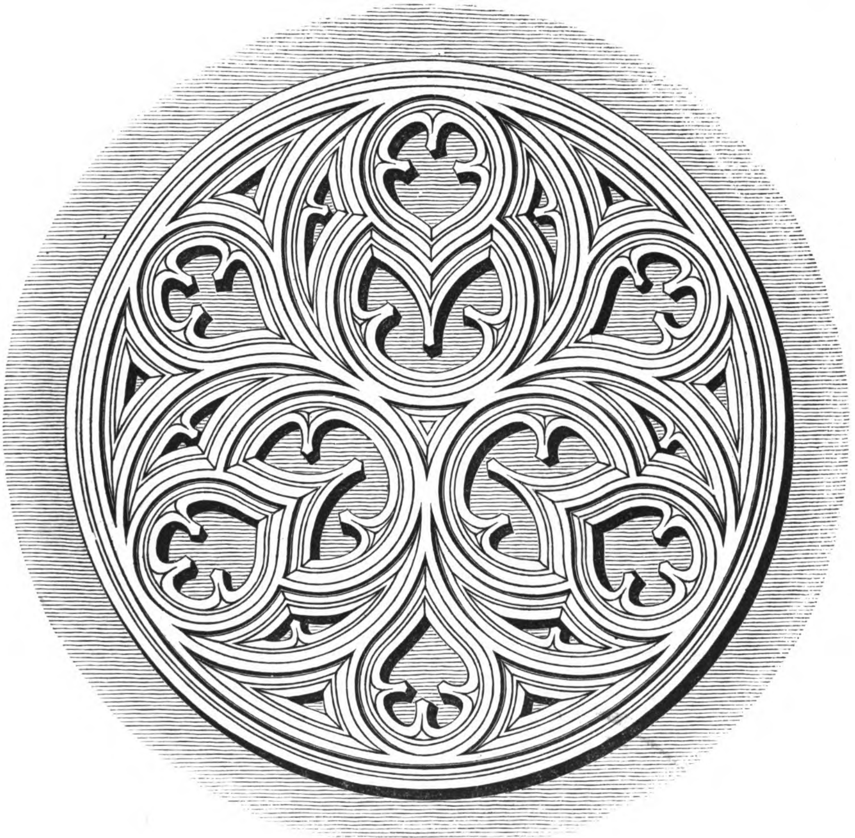

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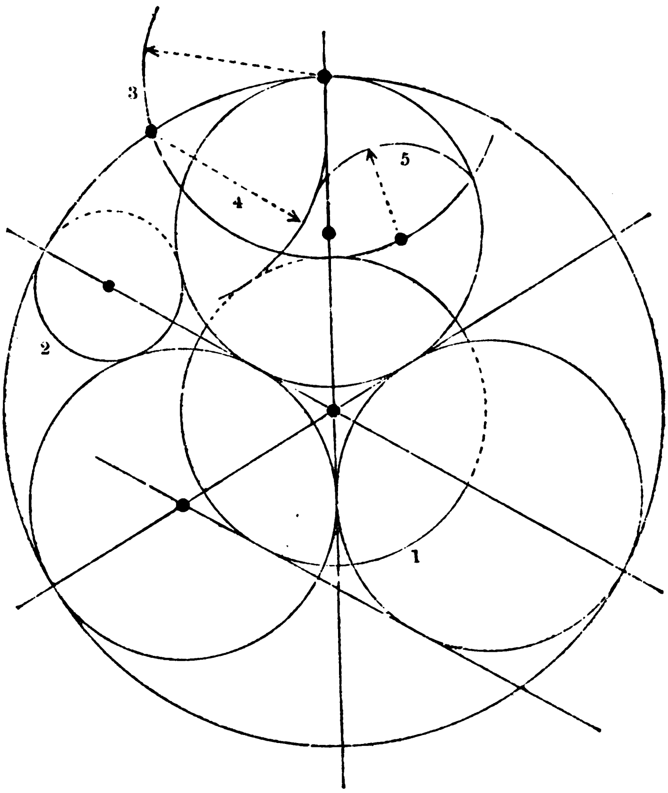

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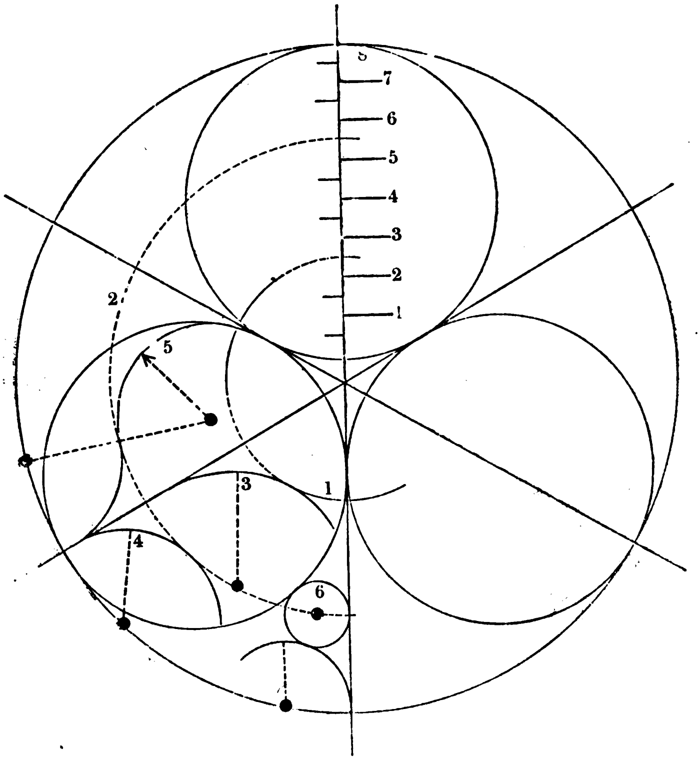
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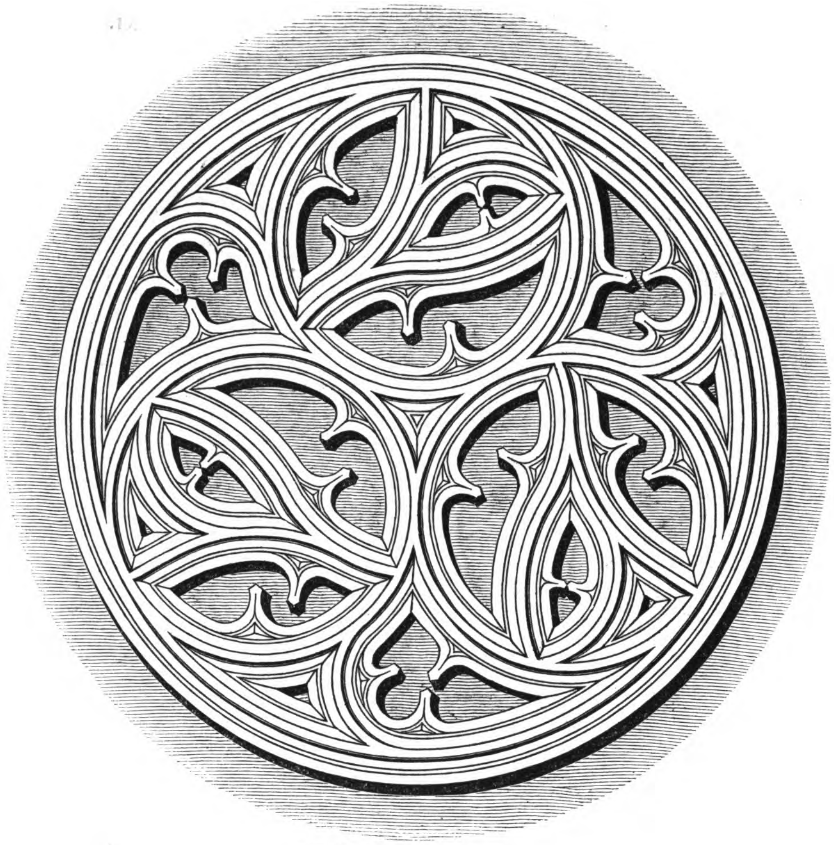

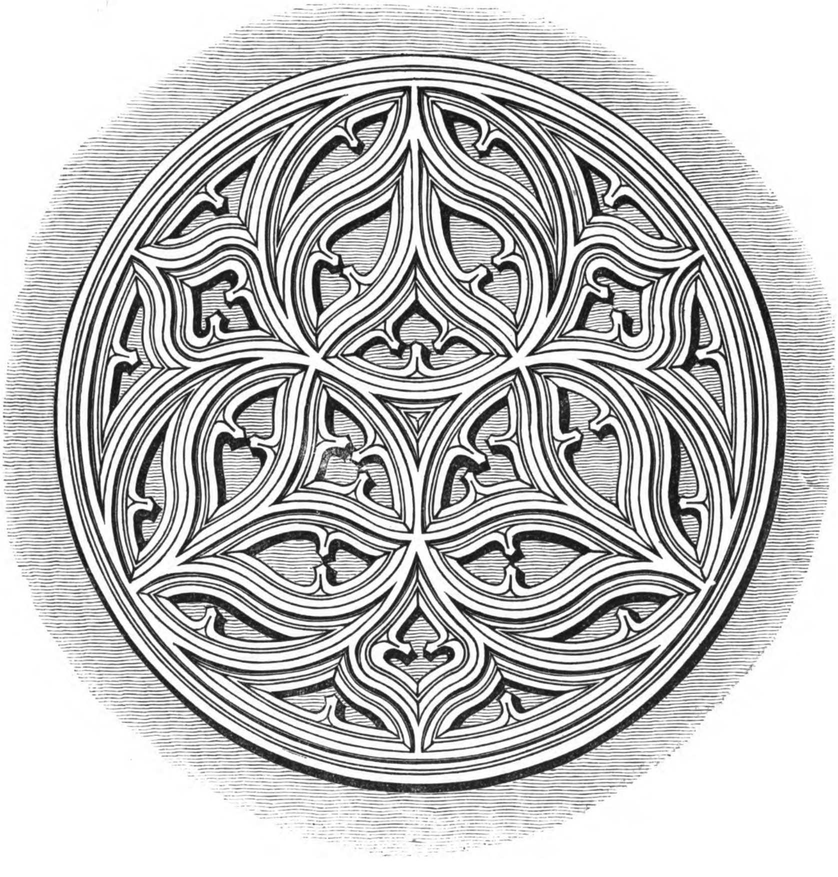

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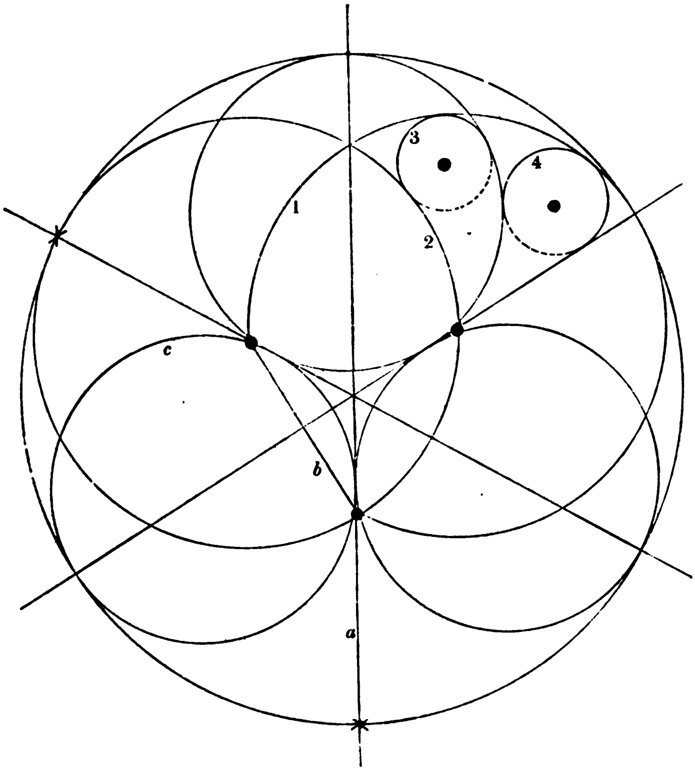

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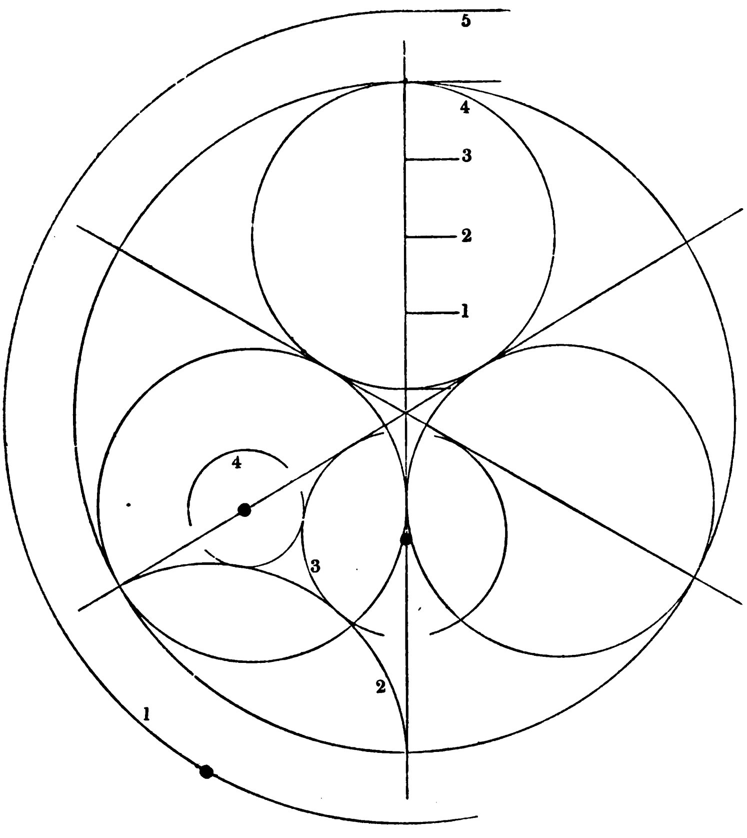

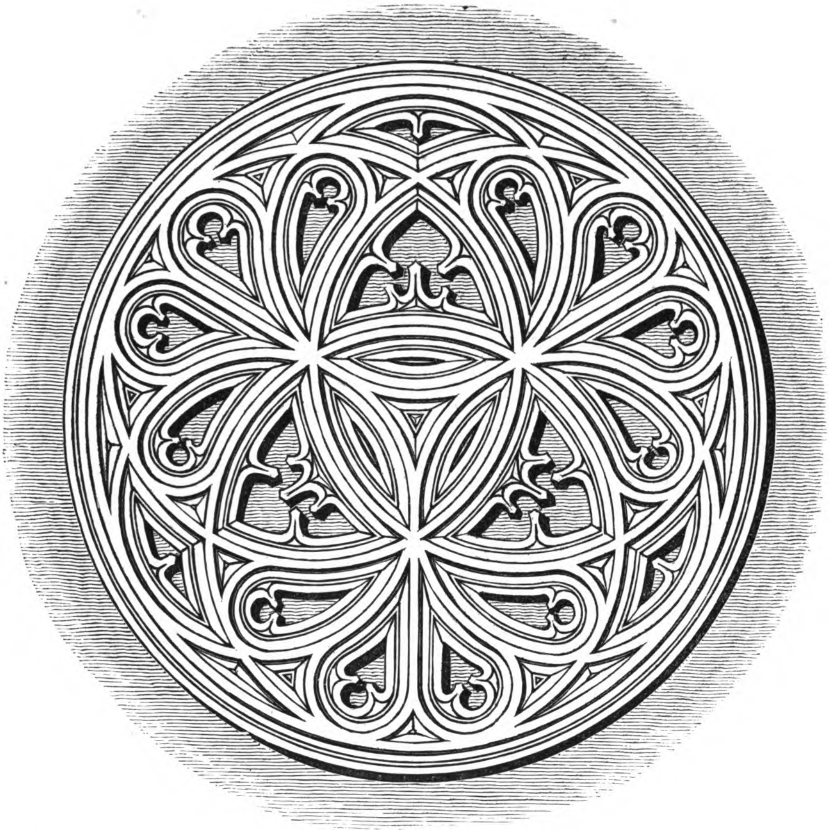

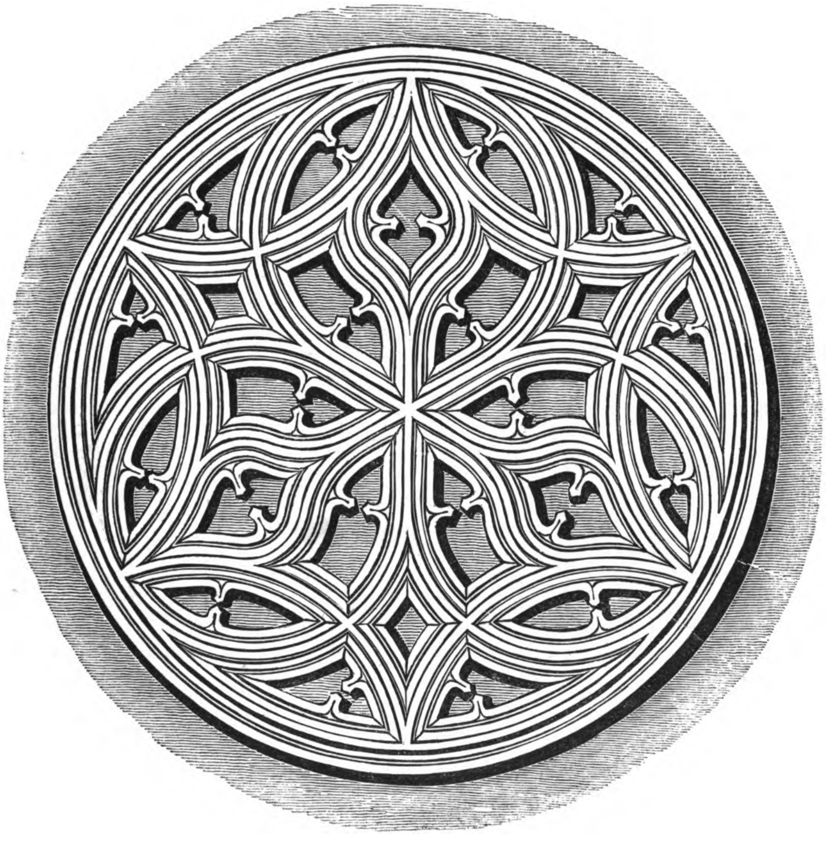

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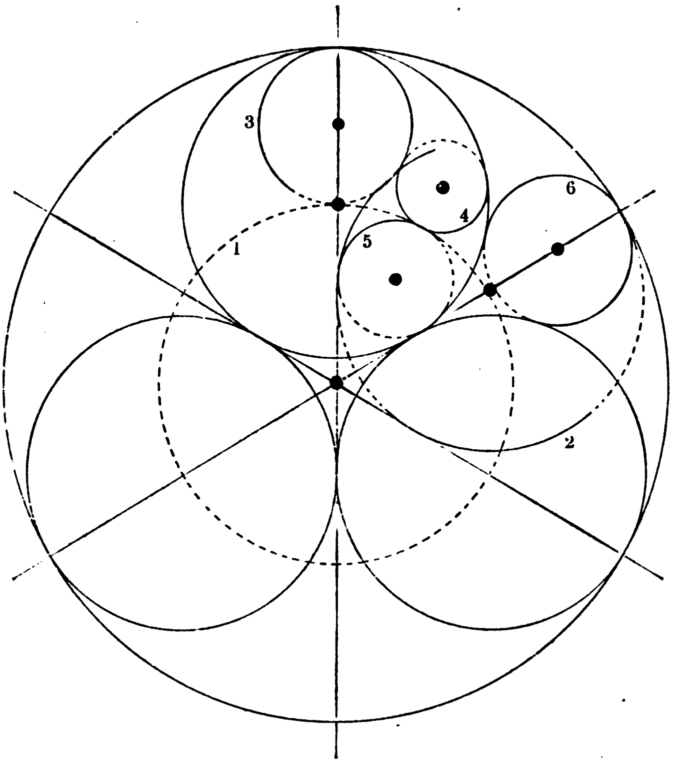

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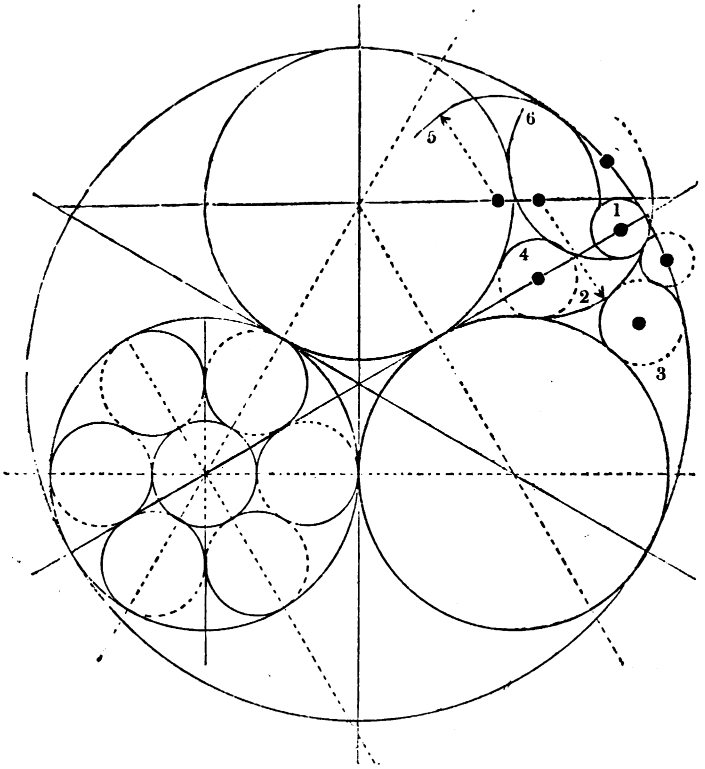

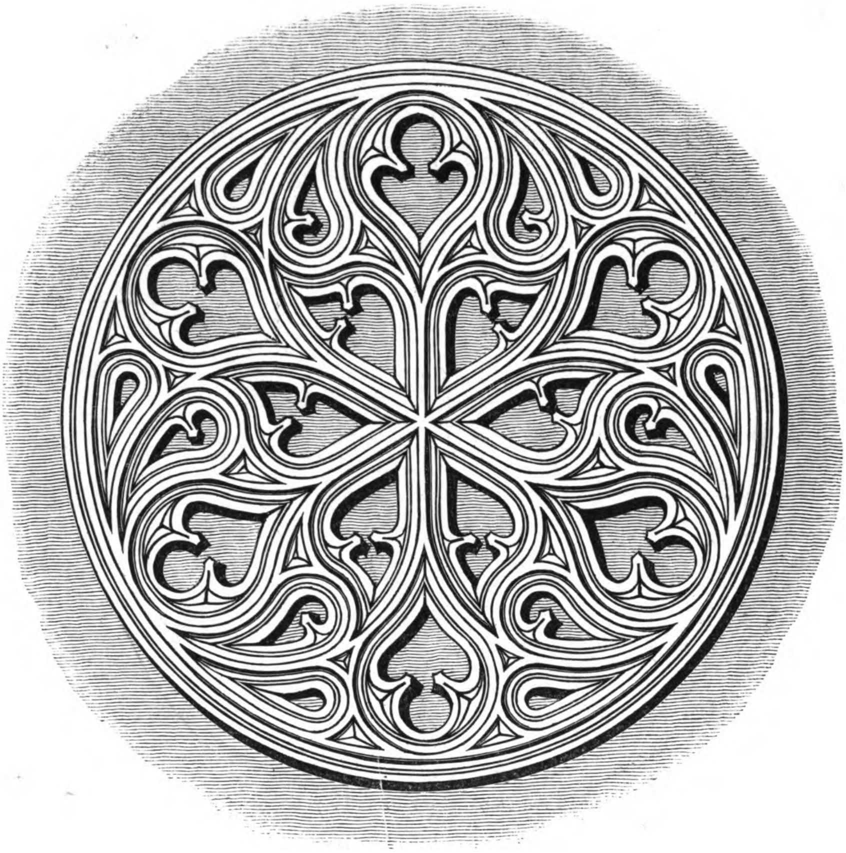

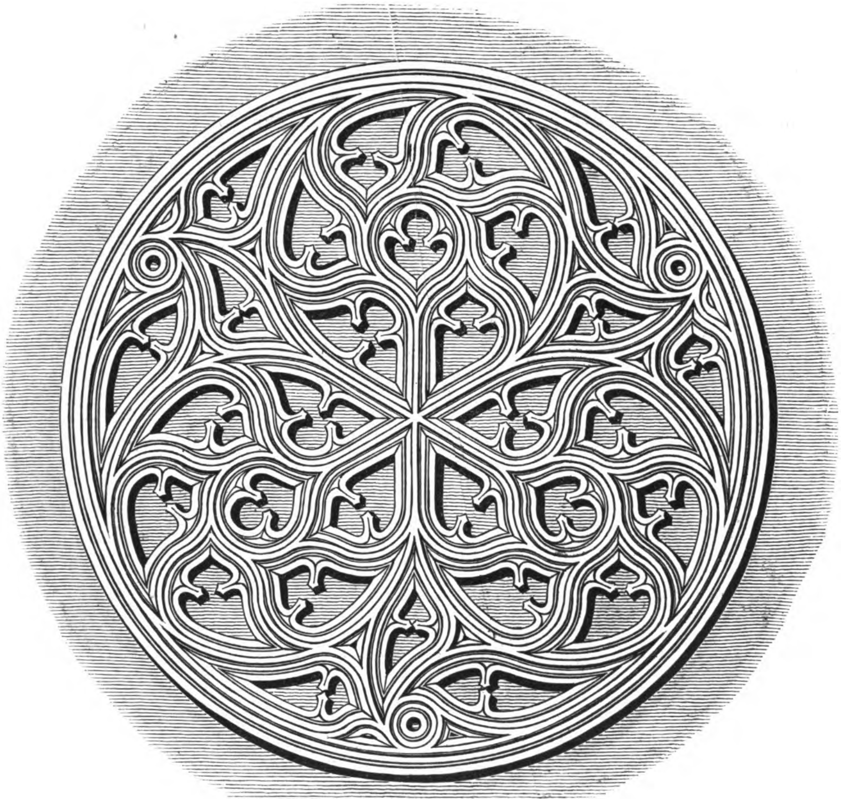

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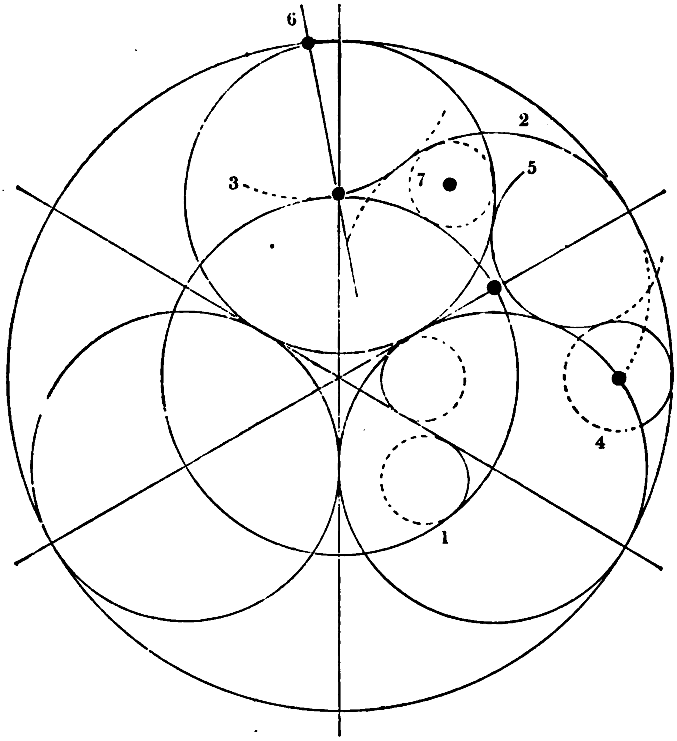

The small unnumbered circles are repetitions of 7.

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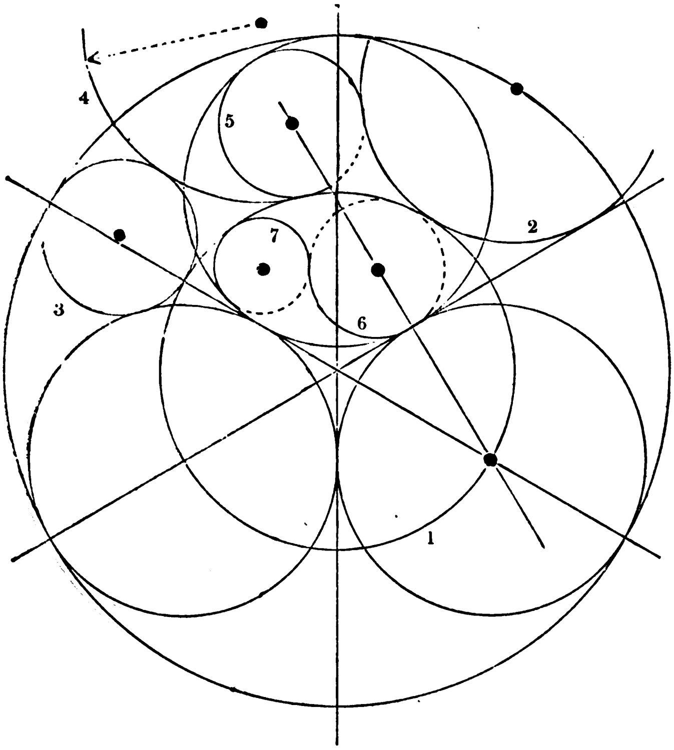
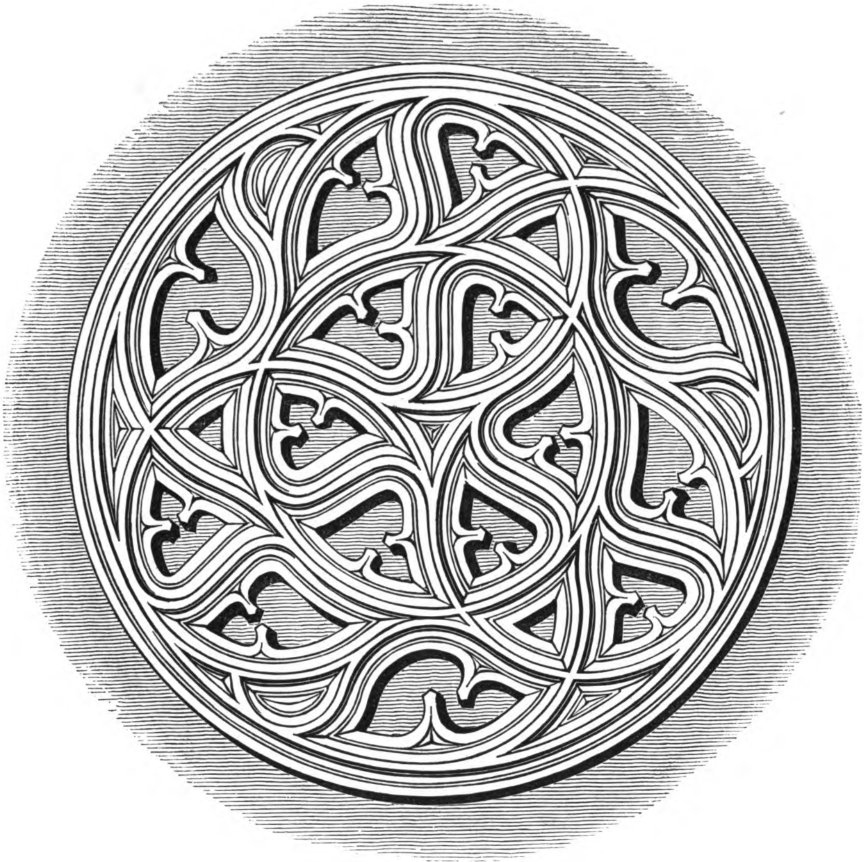
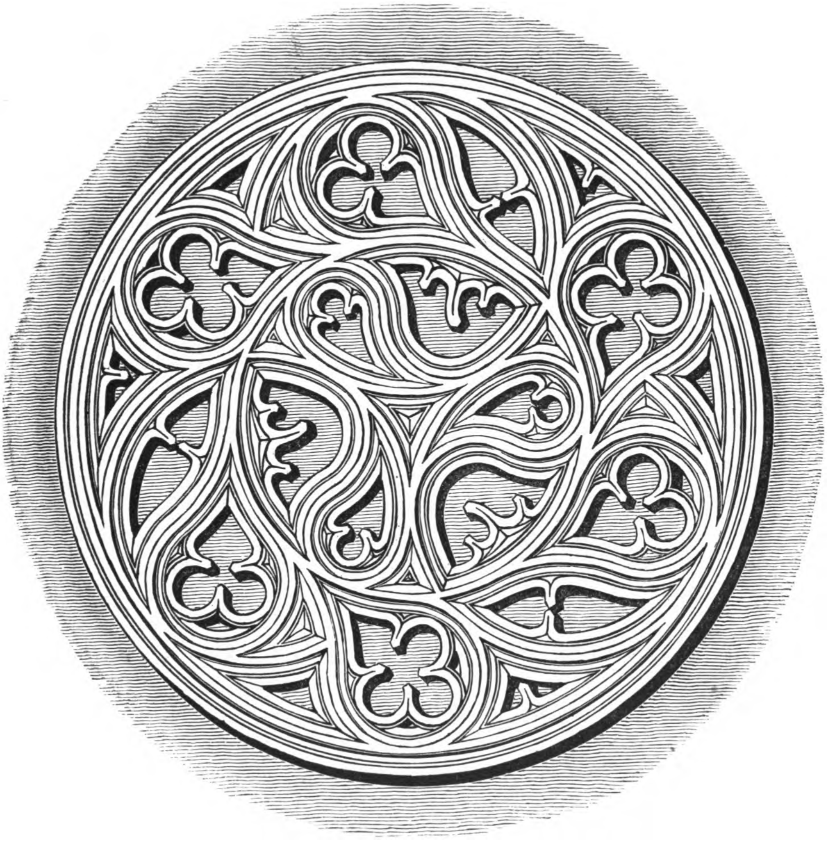


The curves Nos. 1 and 4 are of similar radius.





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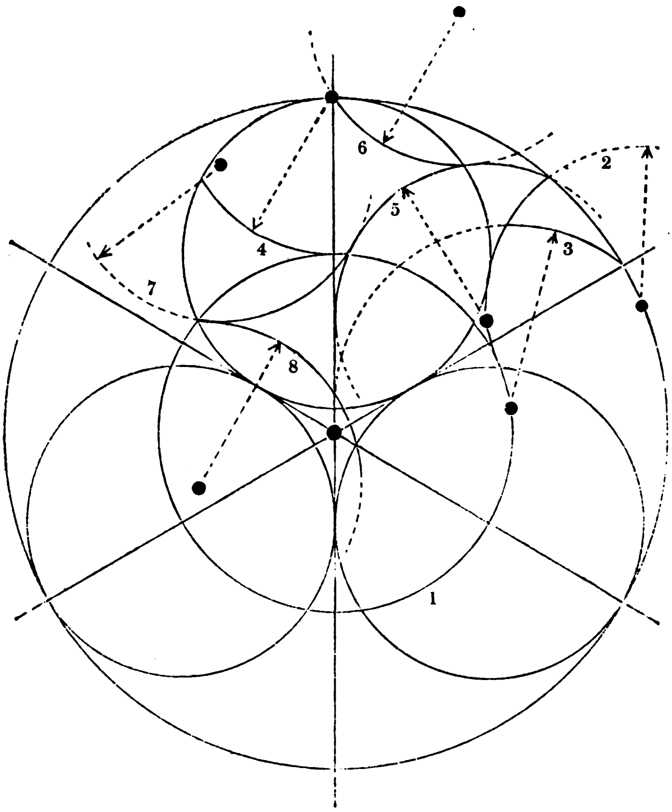

The curves 4 to 8 are all of one radius, that of the primary circles.

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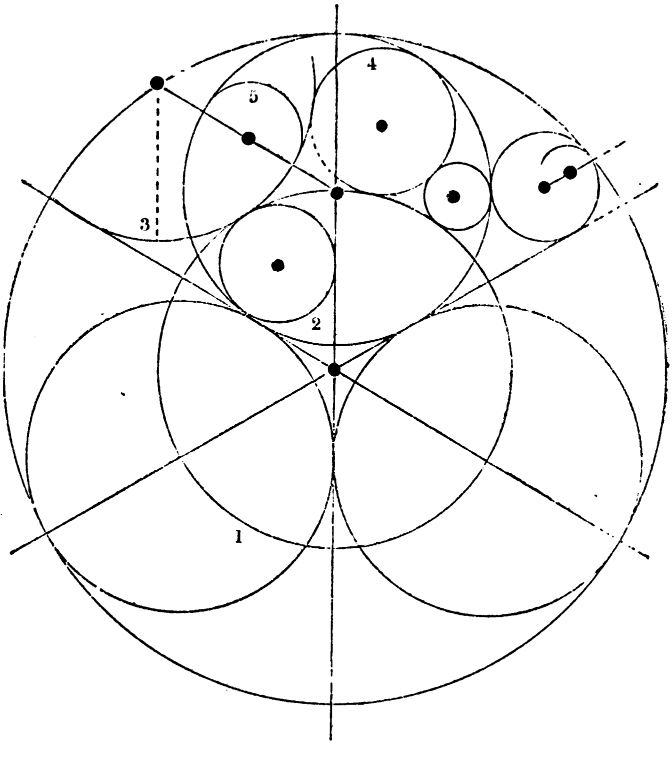

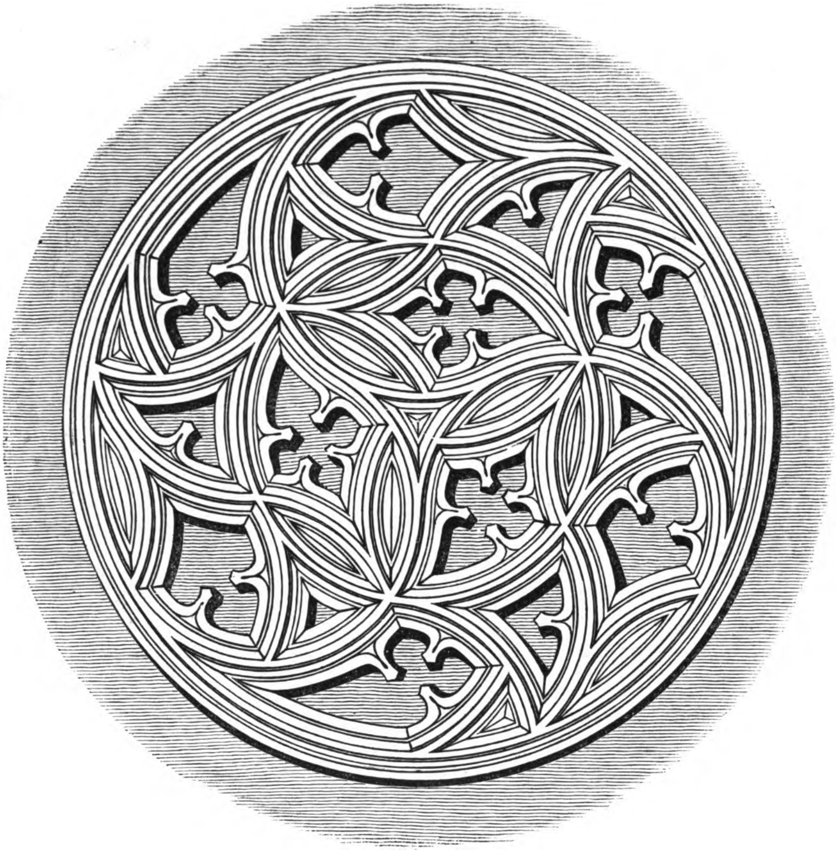

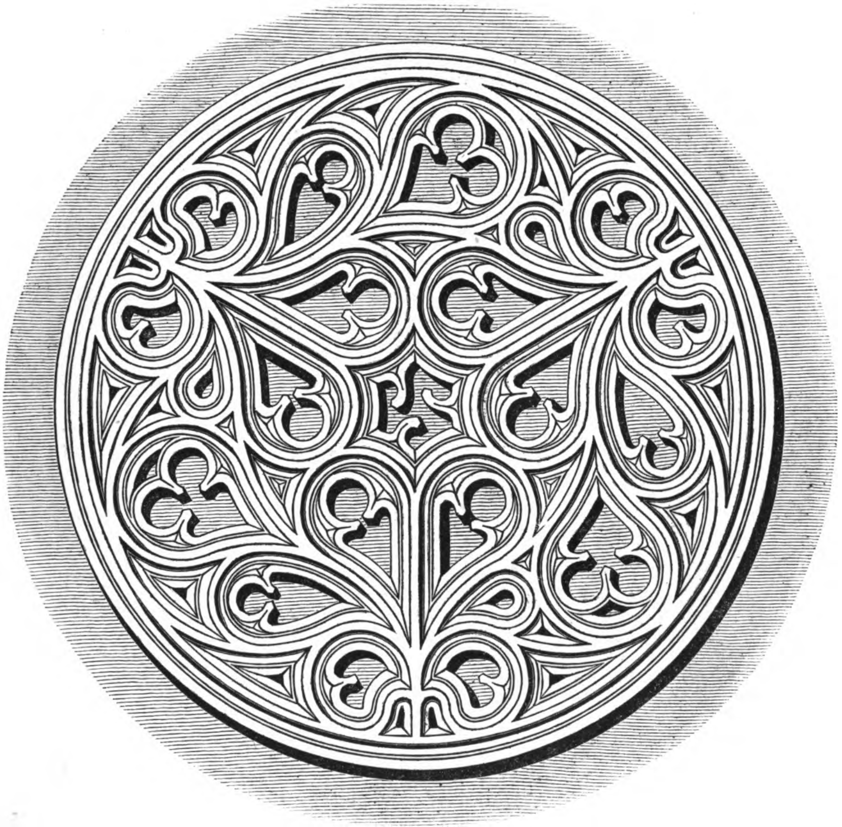

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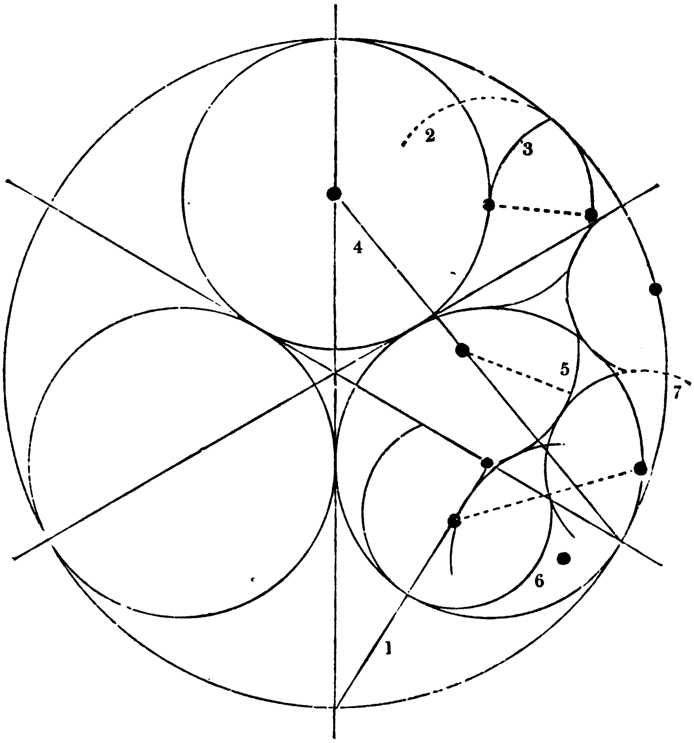

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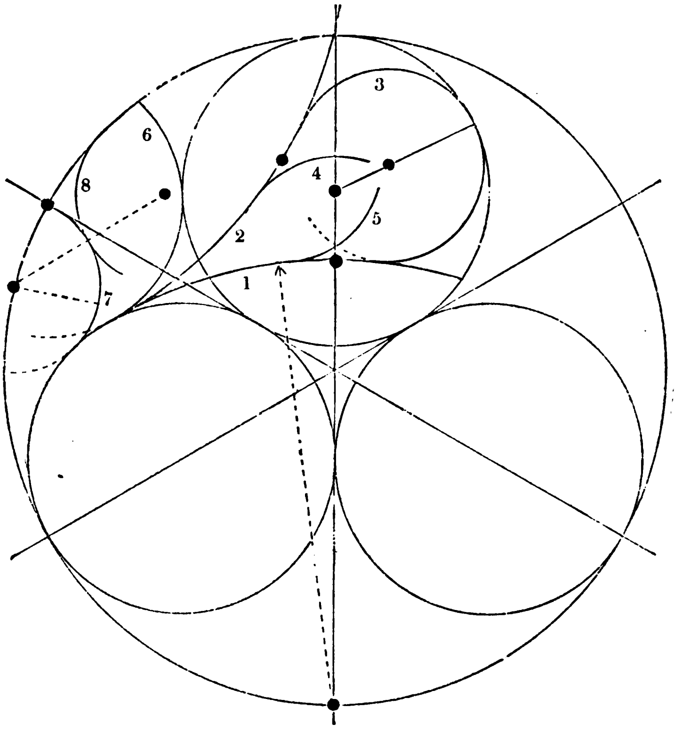

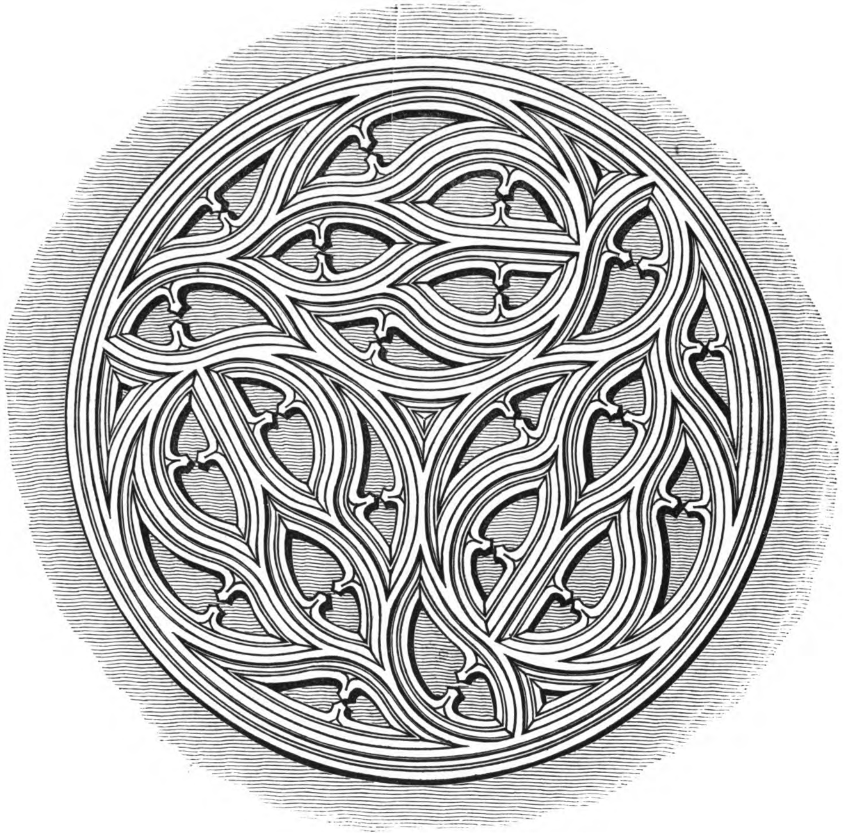

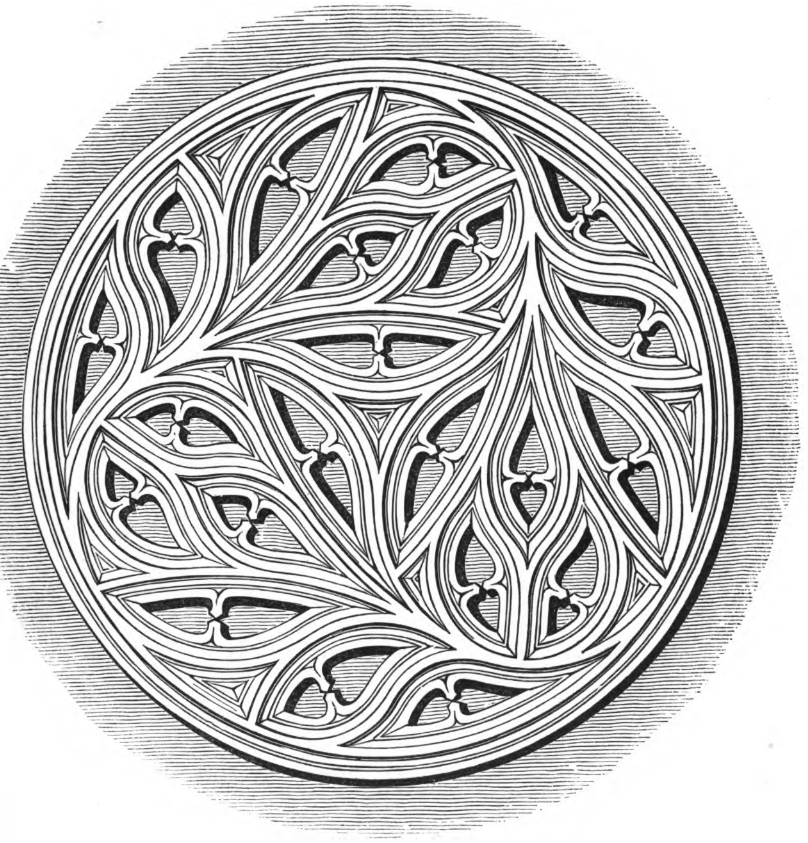

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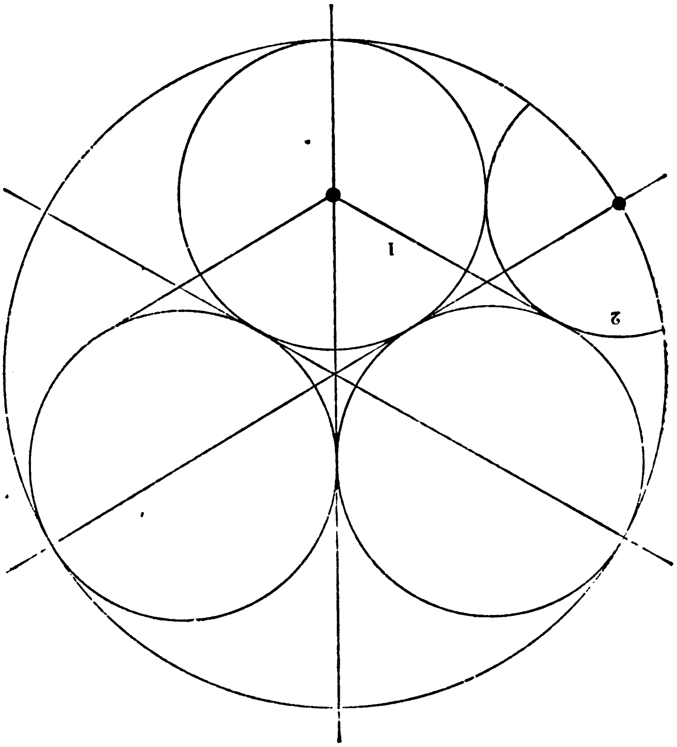

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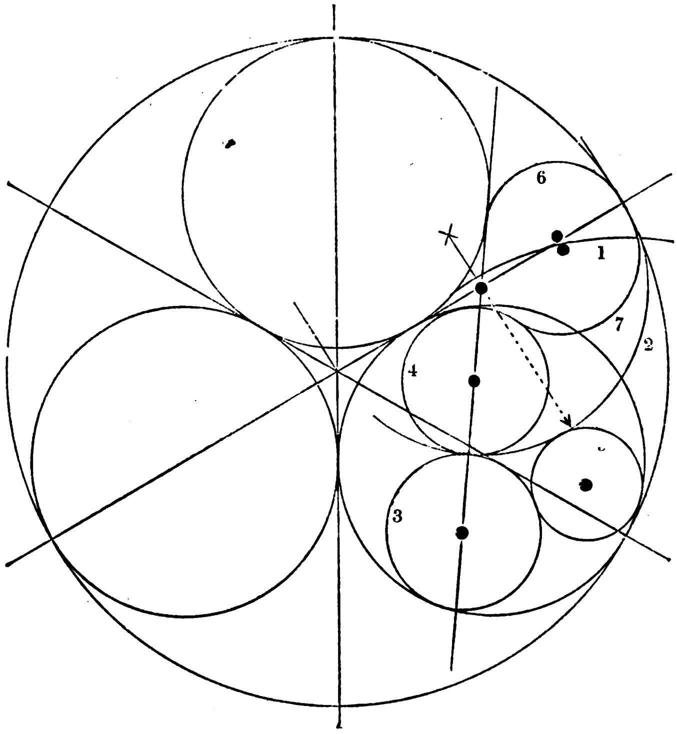

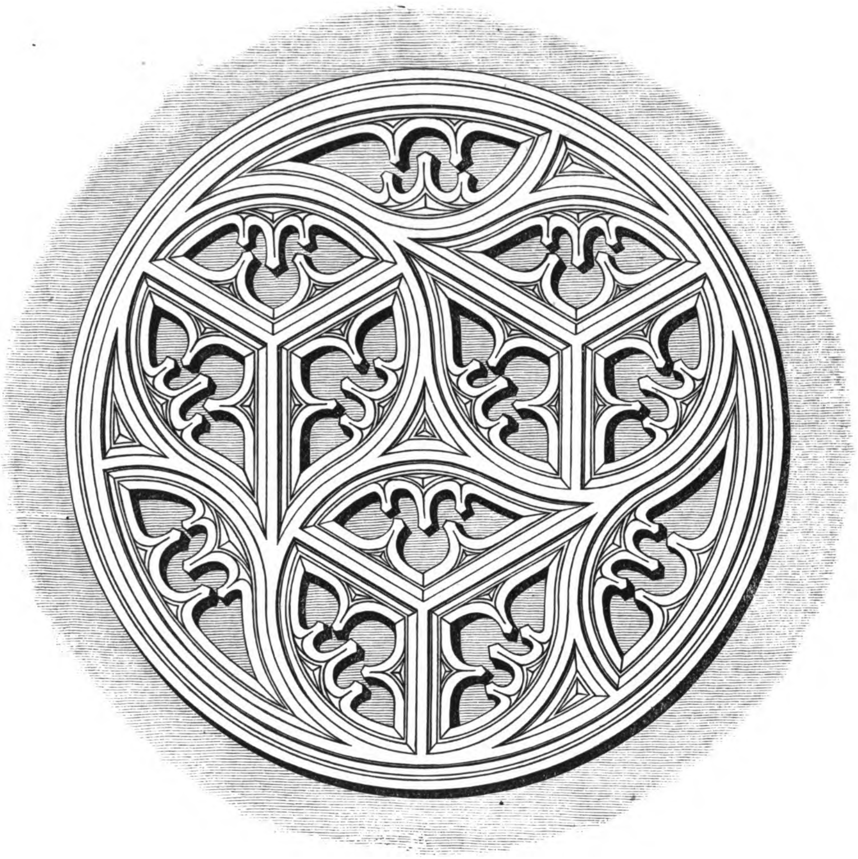

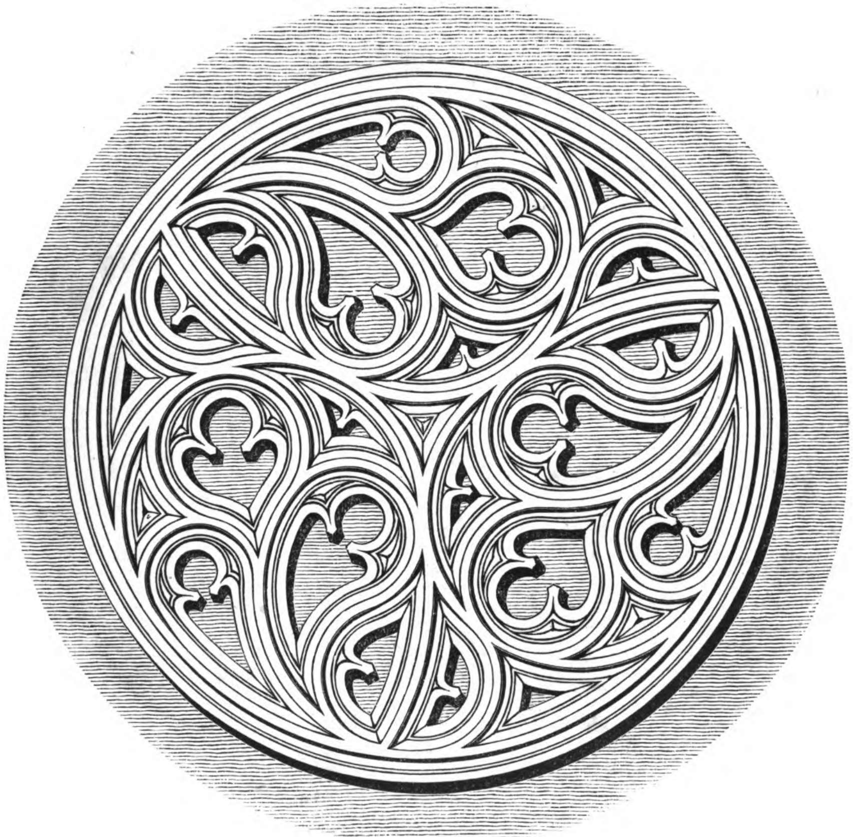

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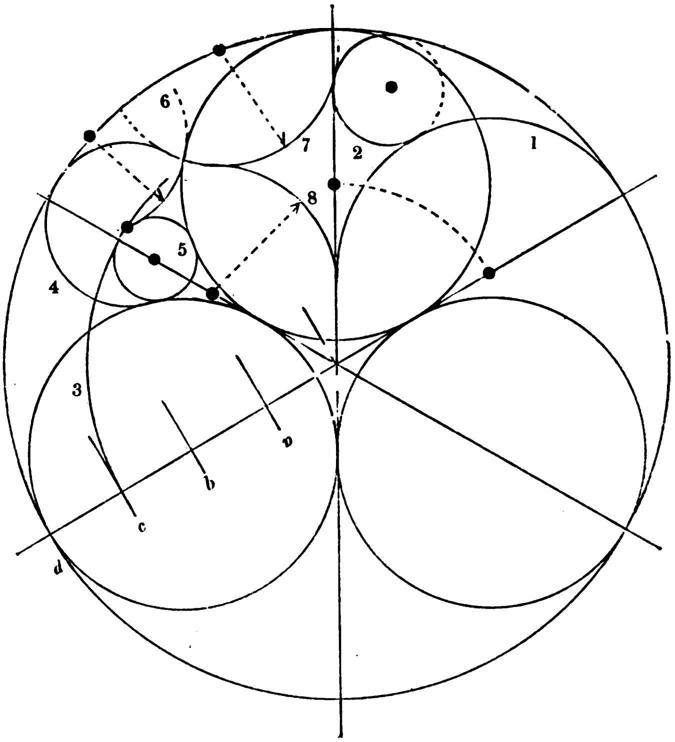
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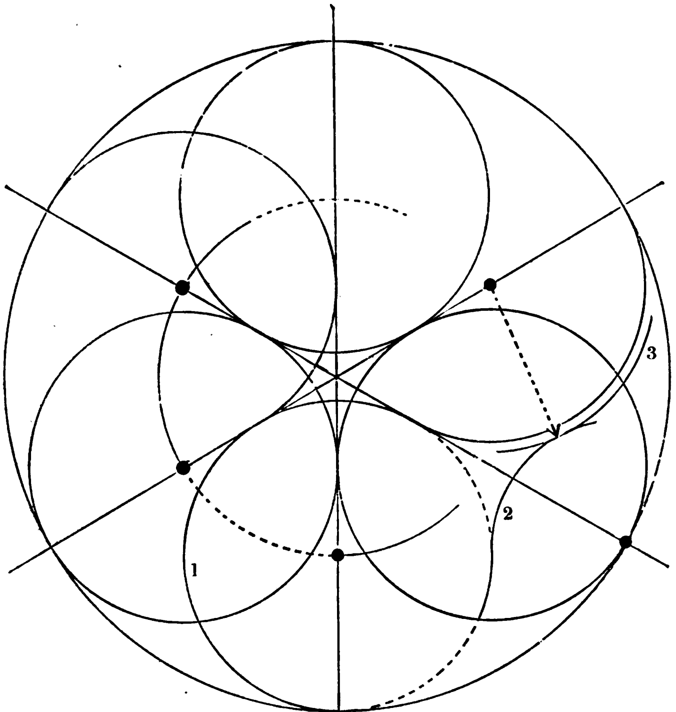

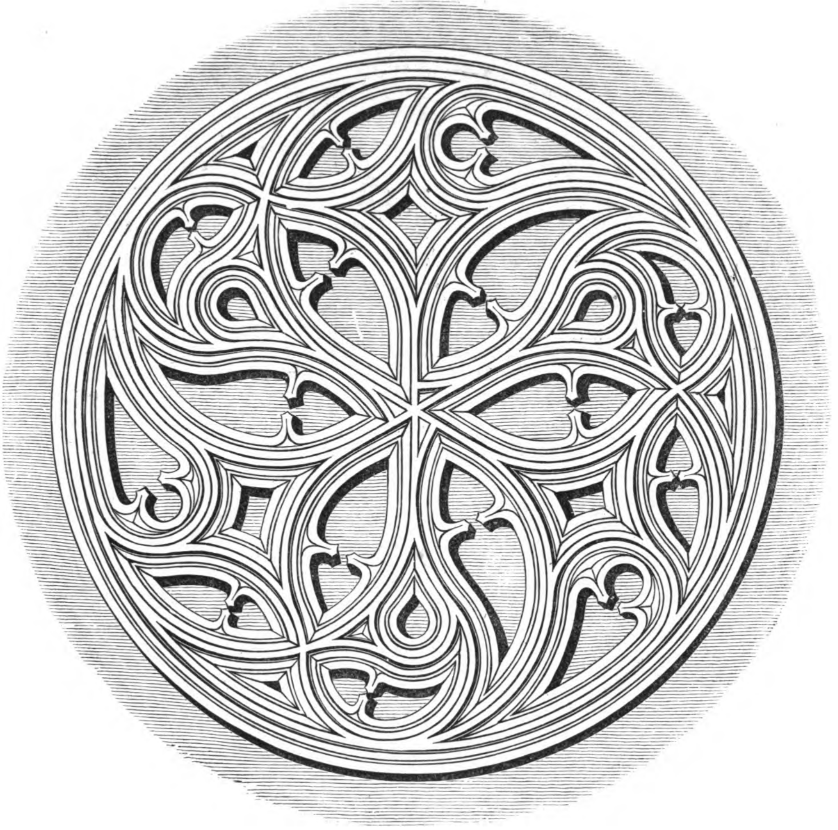

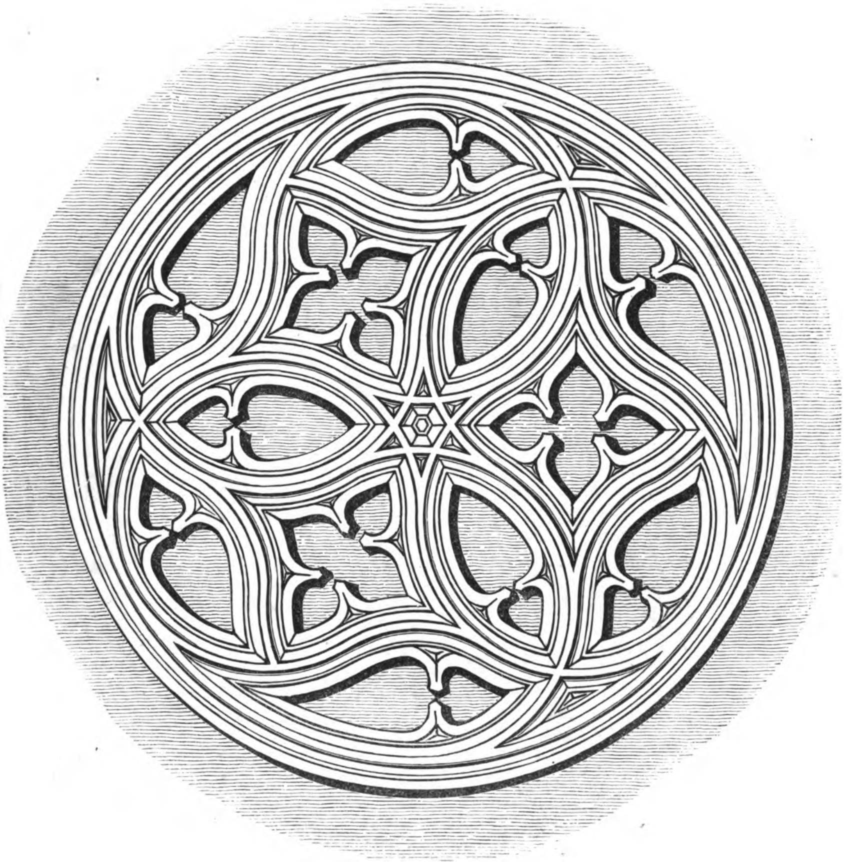

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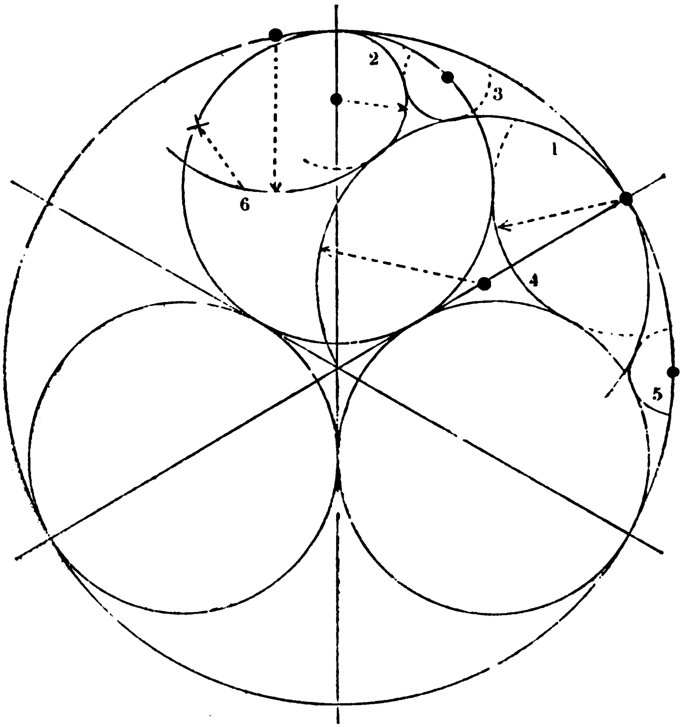

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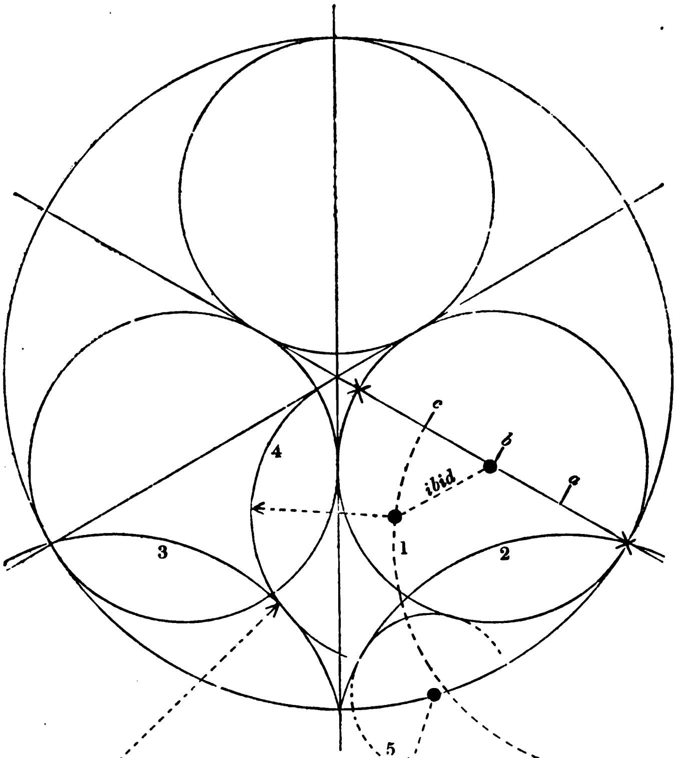
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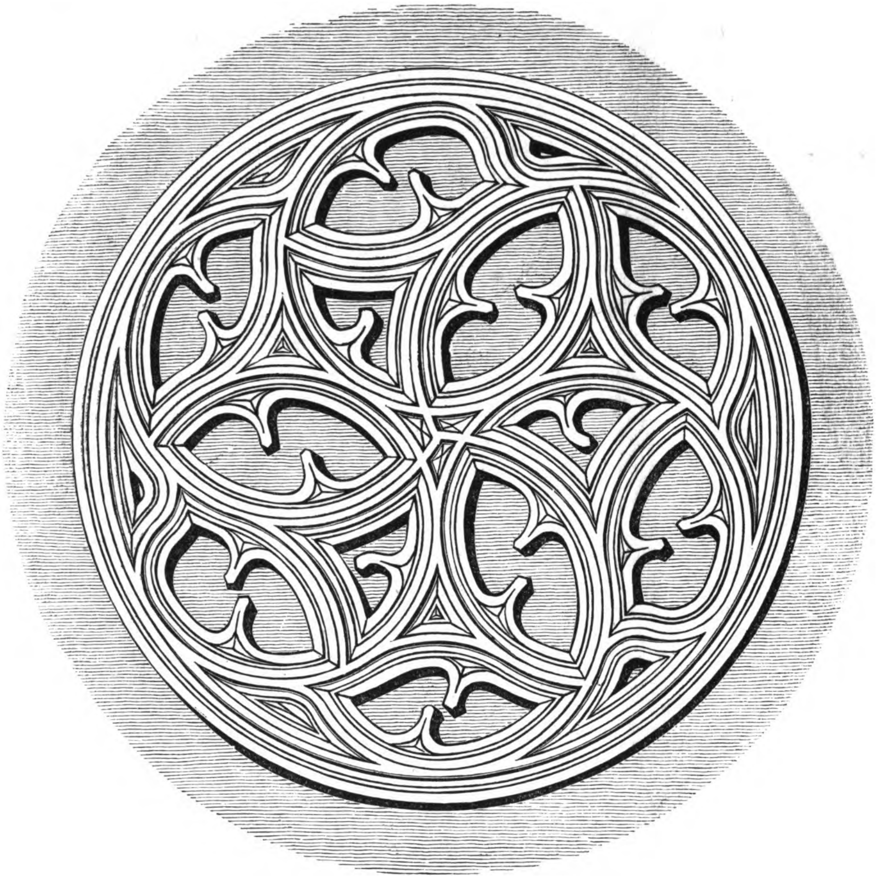
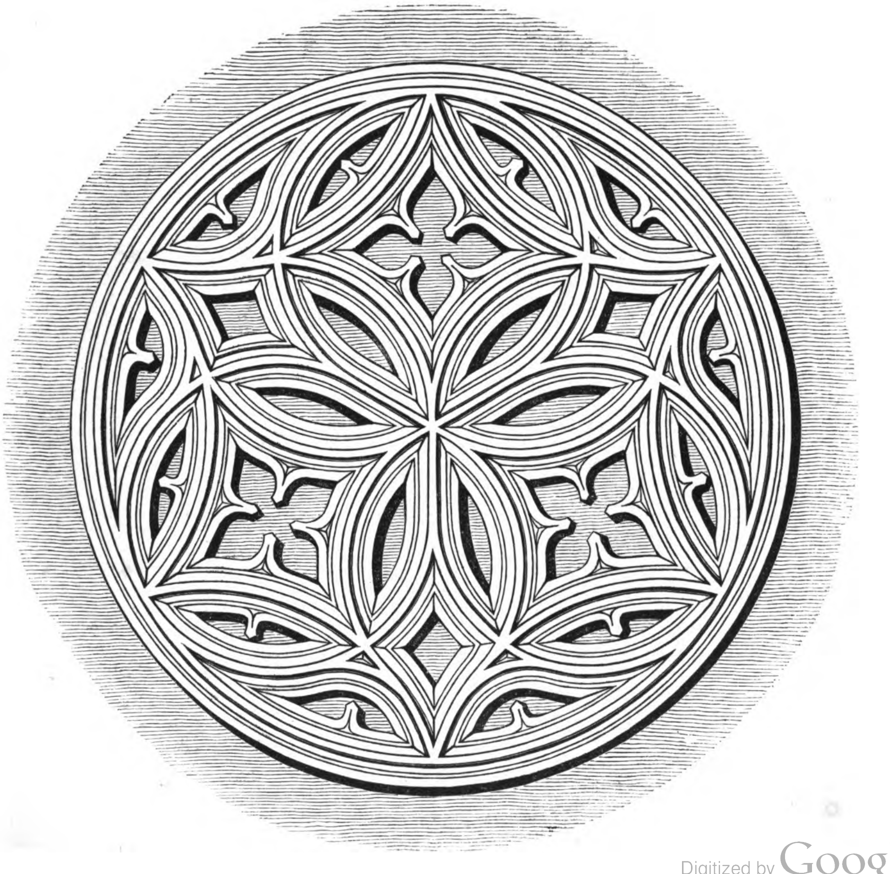
The arcs numbered 1. 2. 3. are of the same radius.





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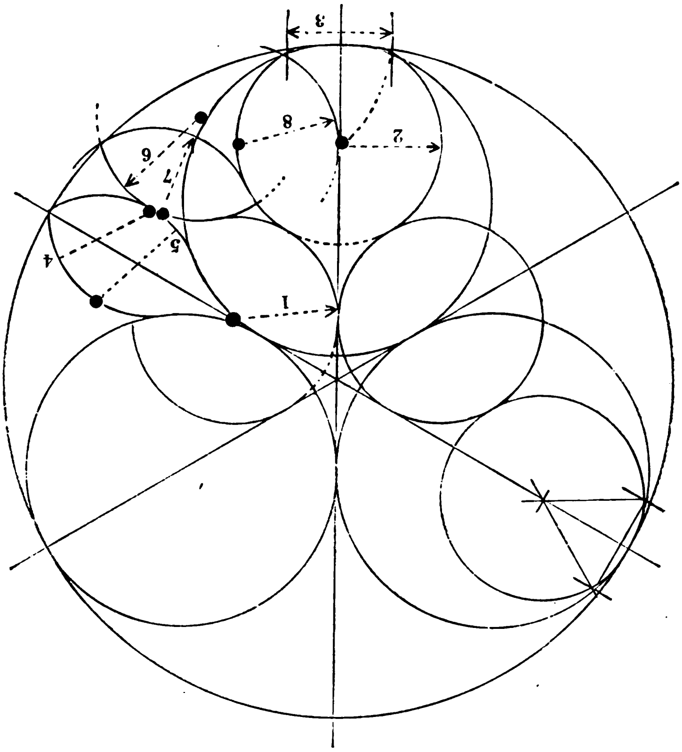
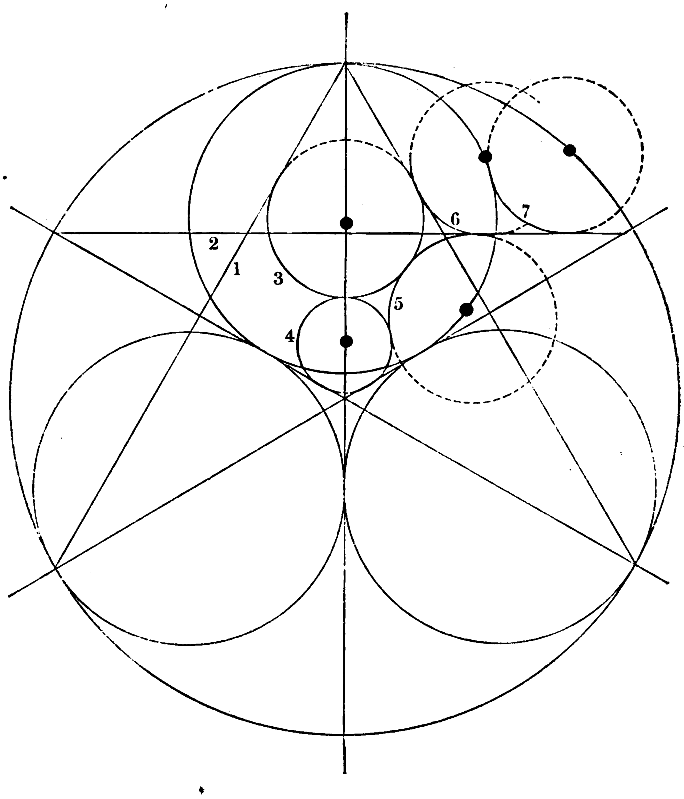
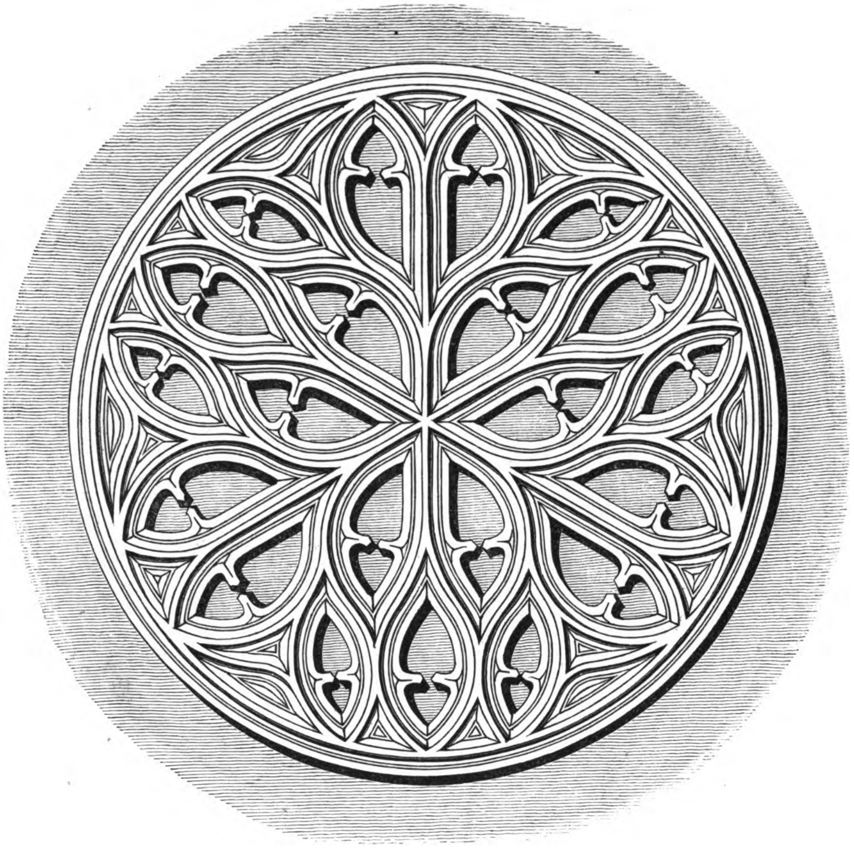
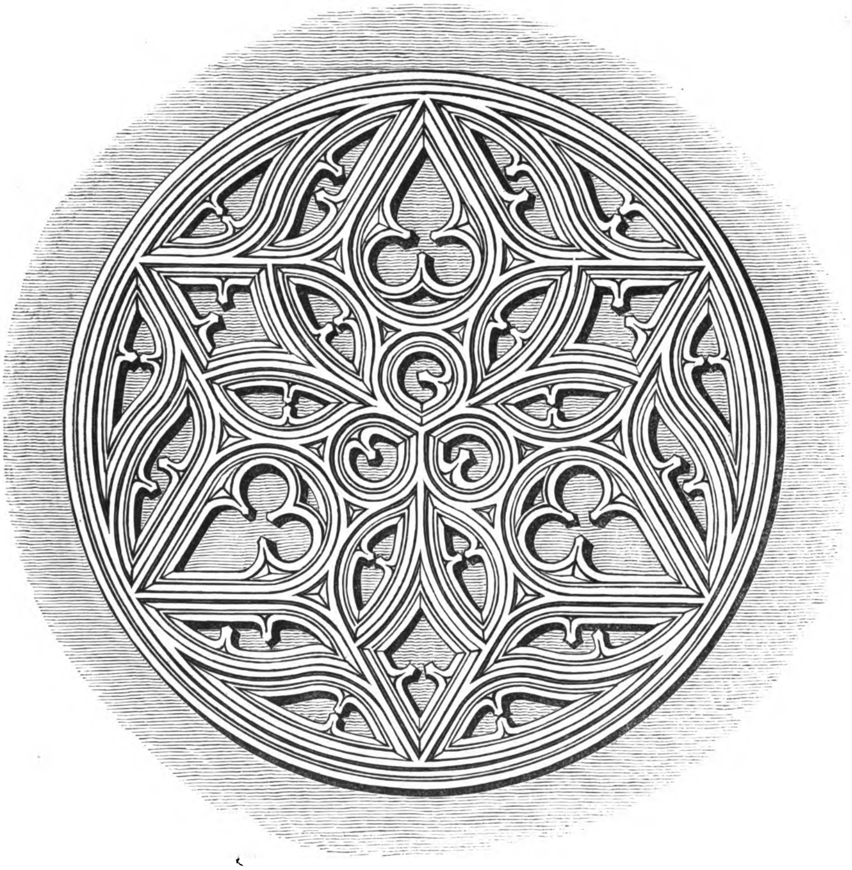


This tracery is formed entirely of one secondary curve and the three inclosed circles. Nos. 1. to 8. are therefore so many repetitions.

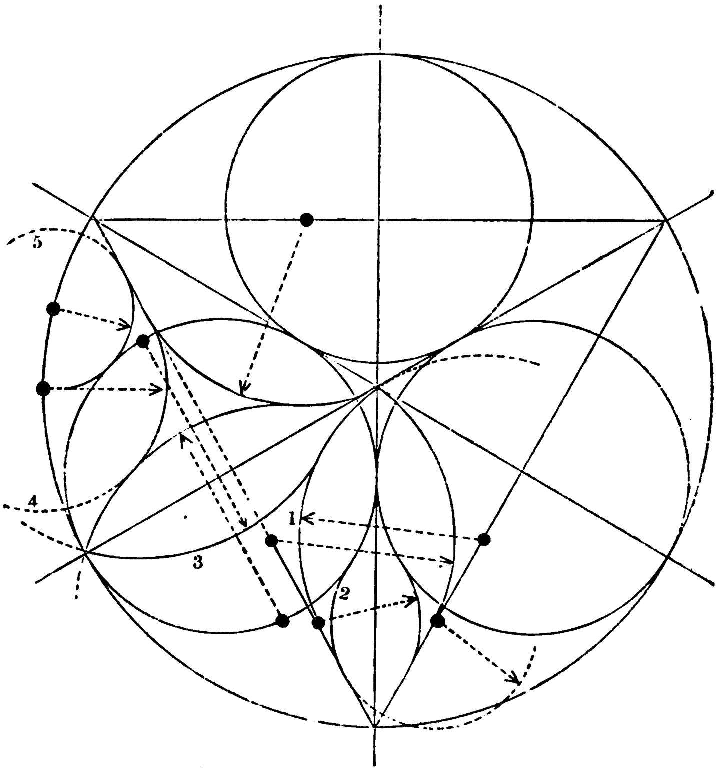
XXVIII.



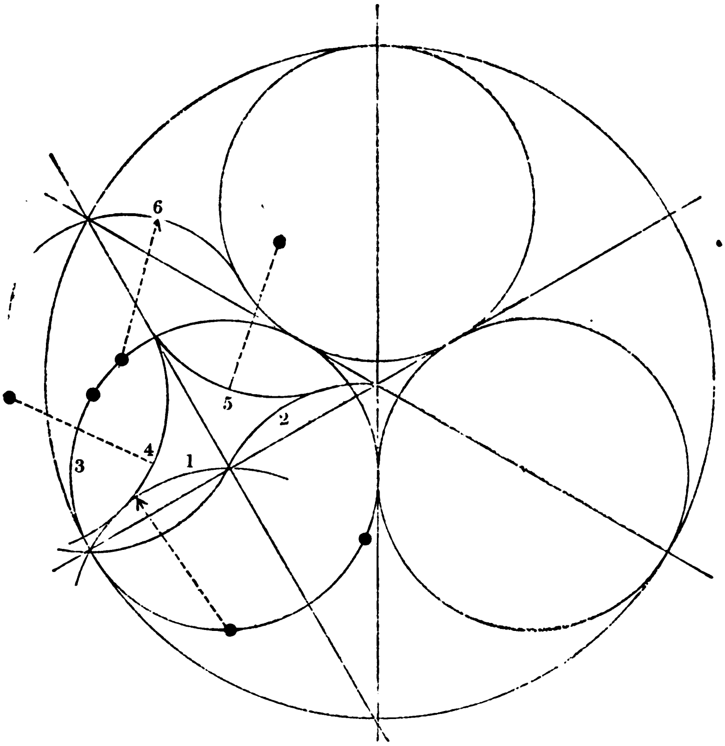


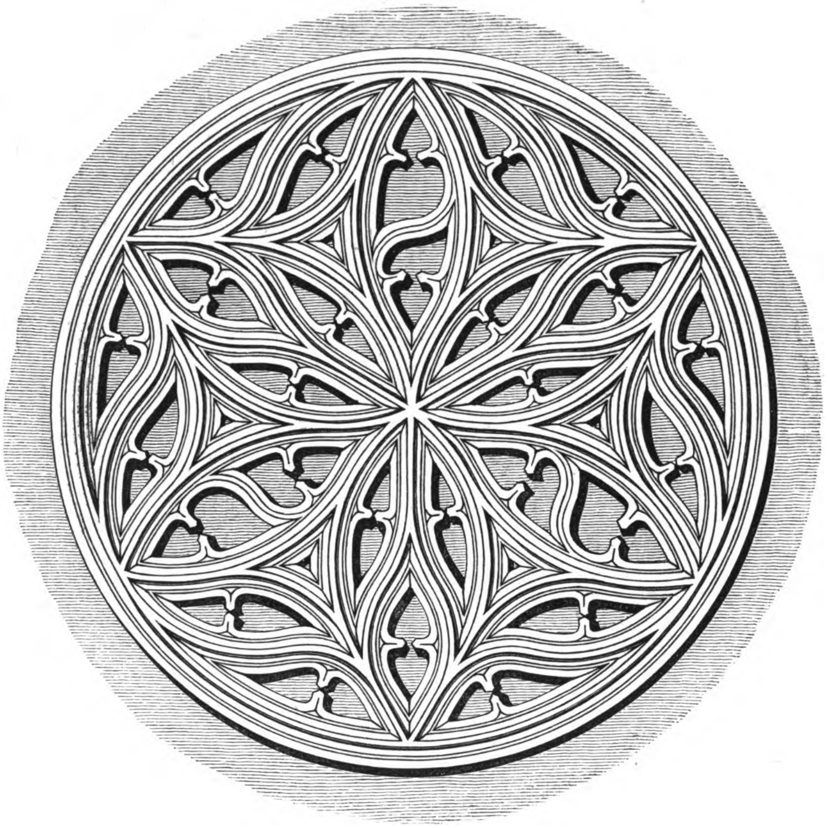


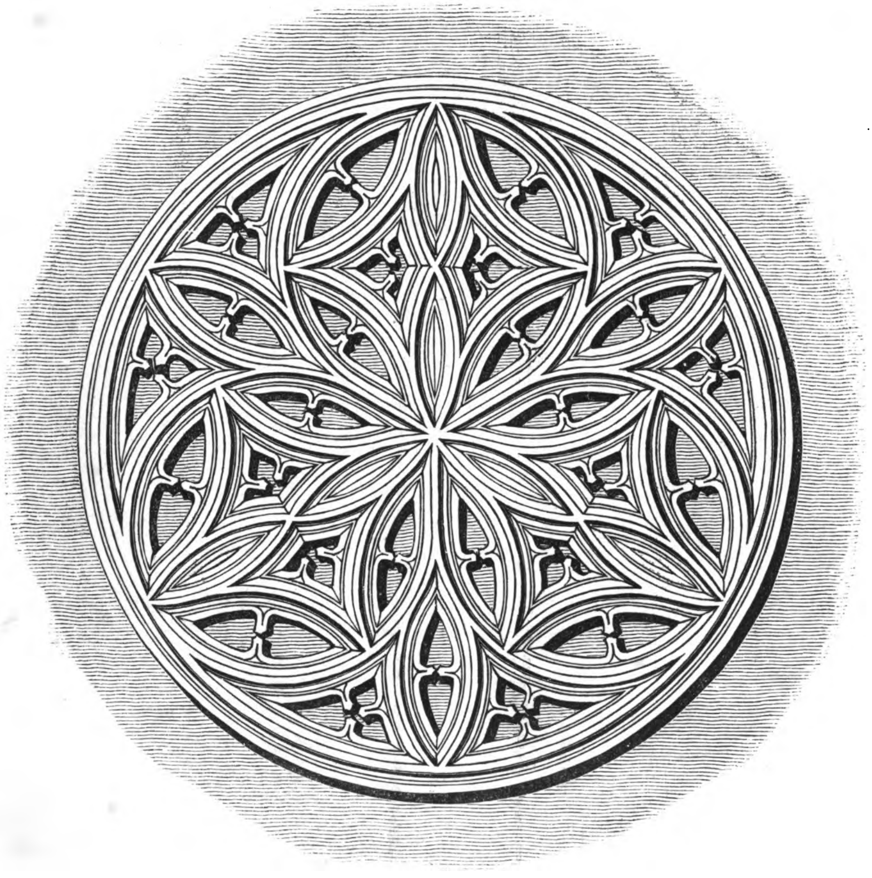
XXIX.



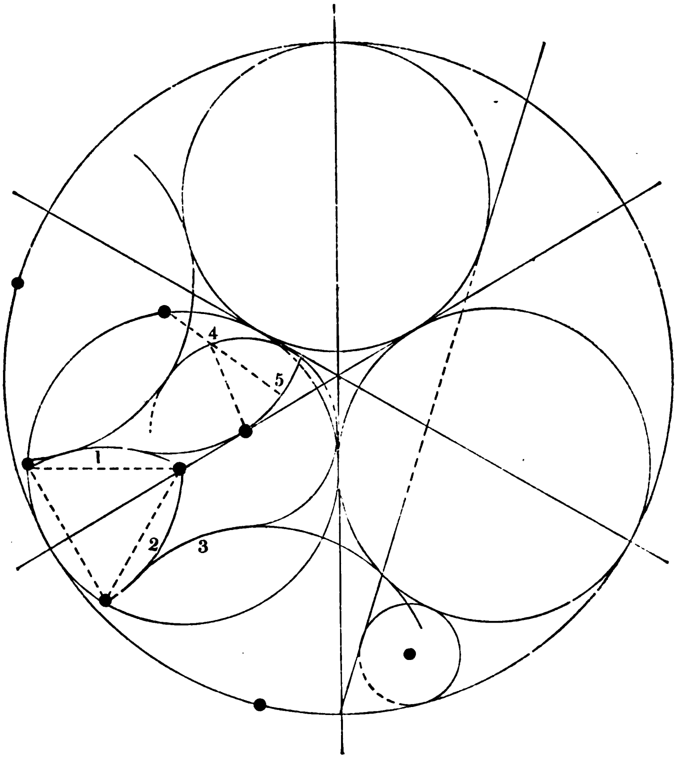
XXX.







XXXI.



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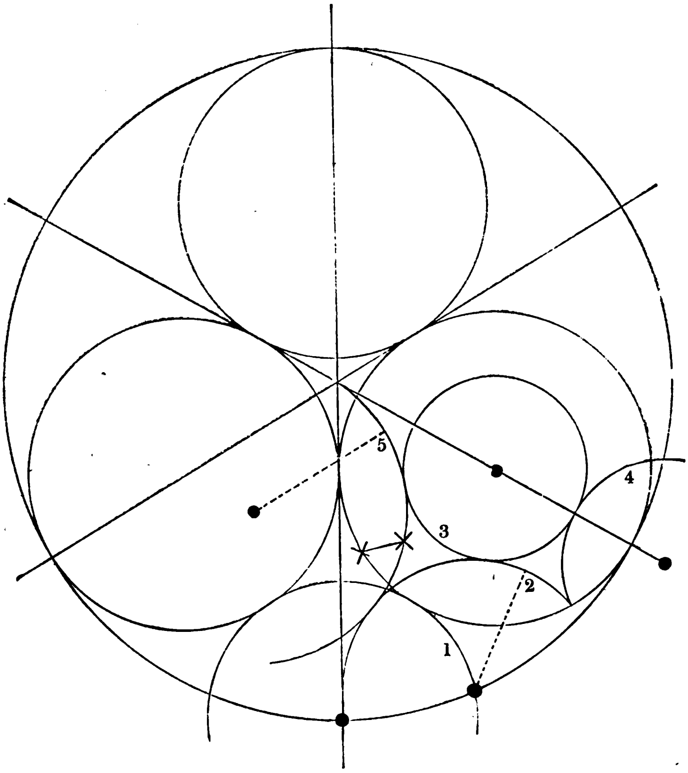
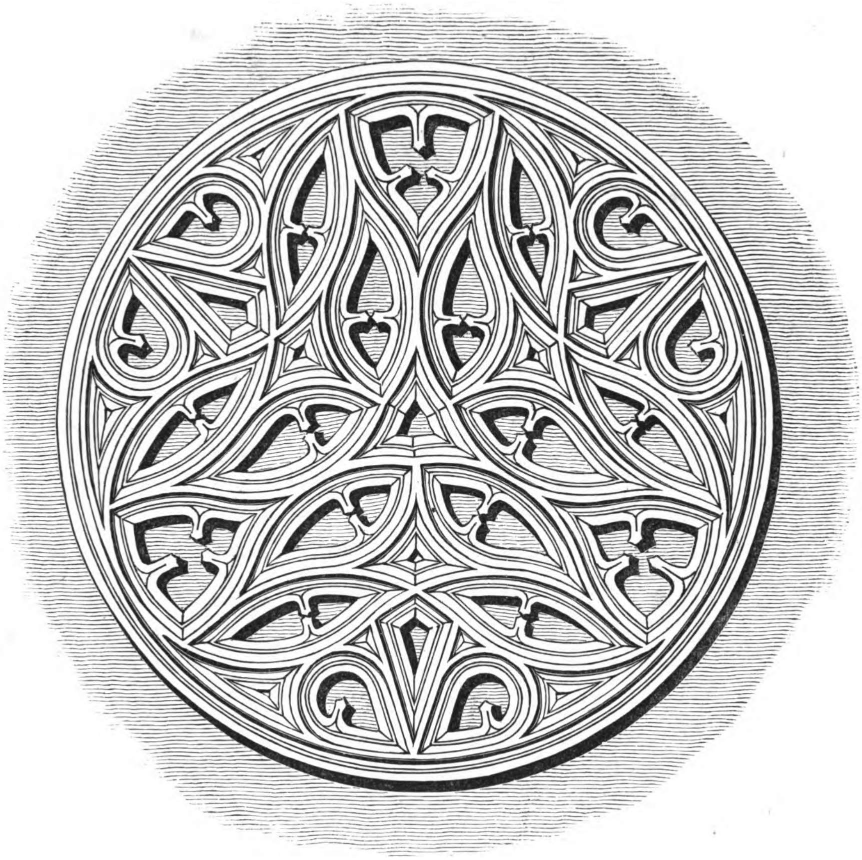
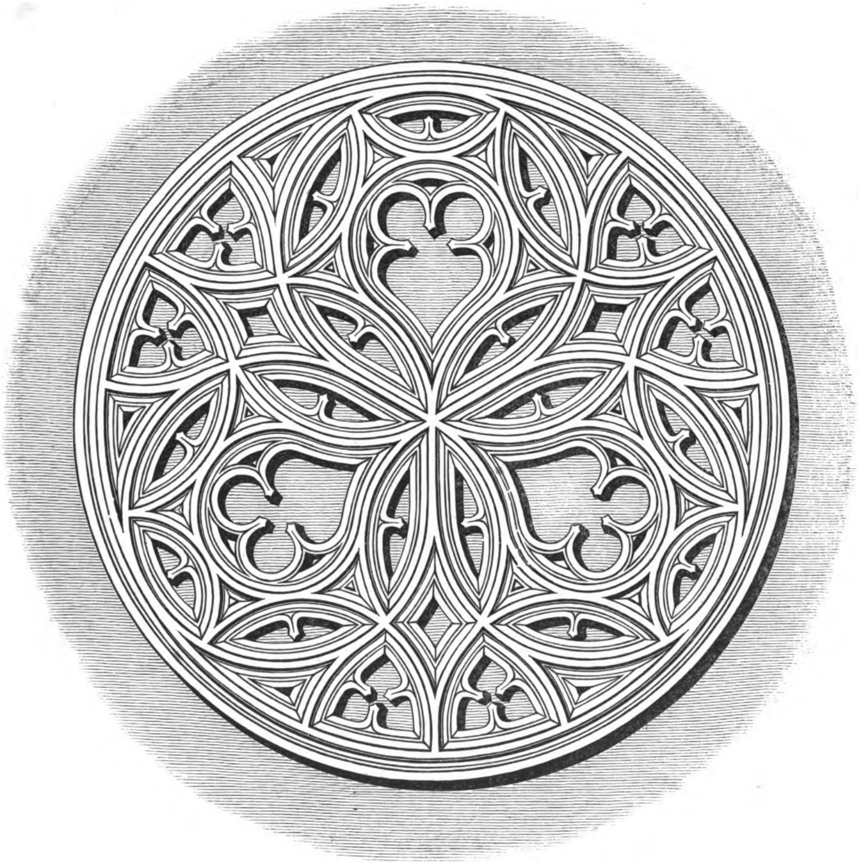
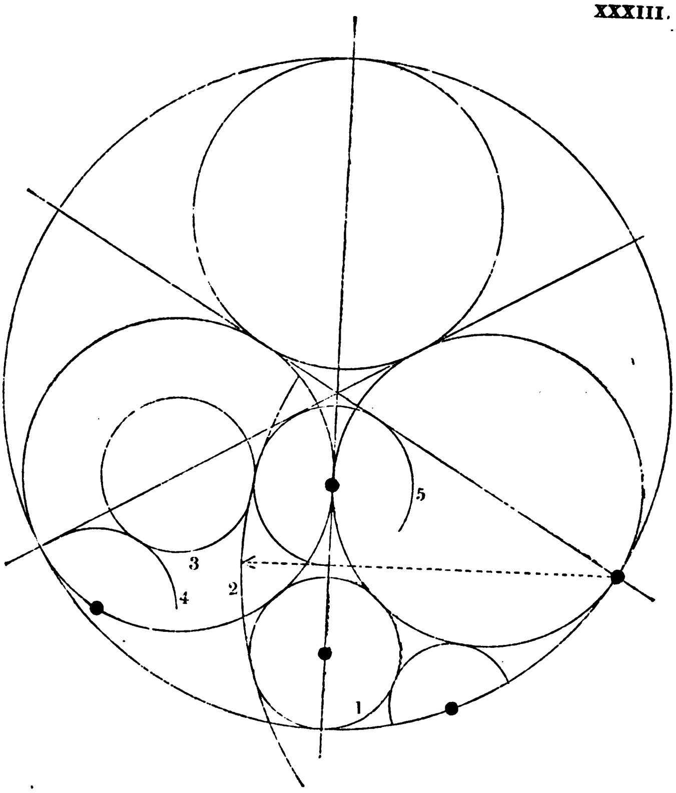


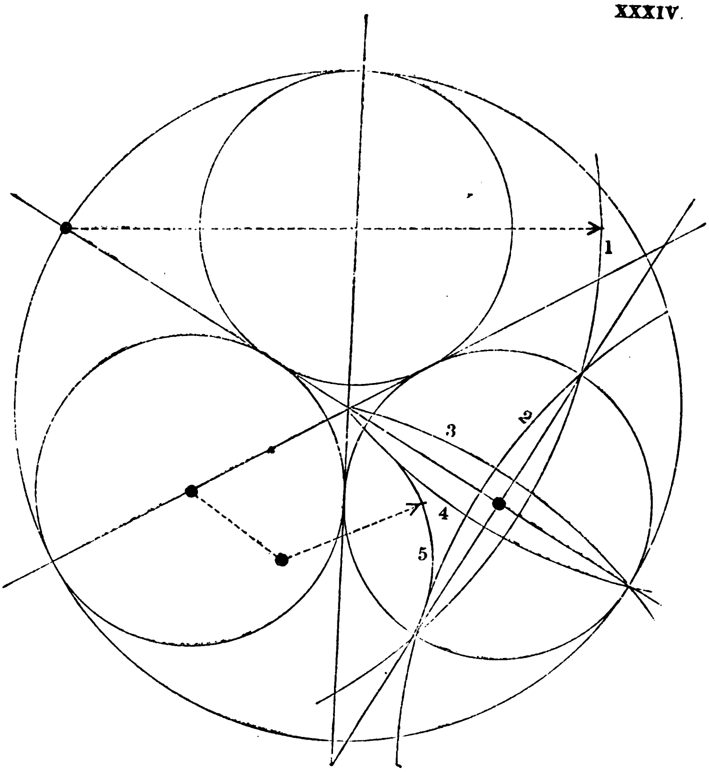




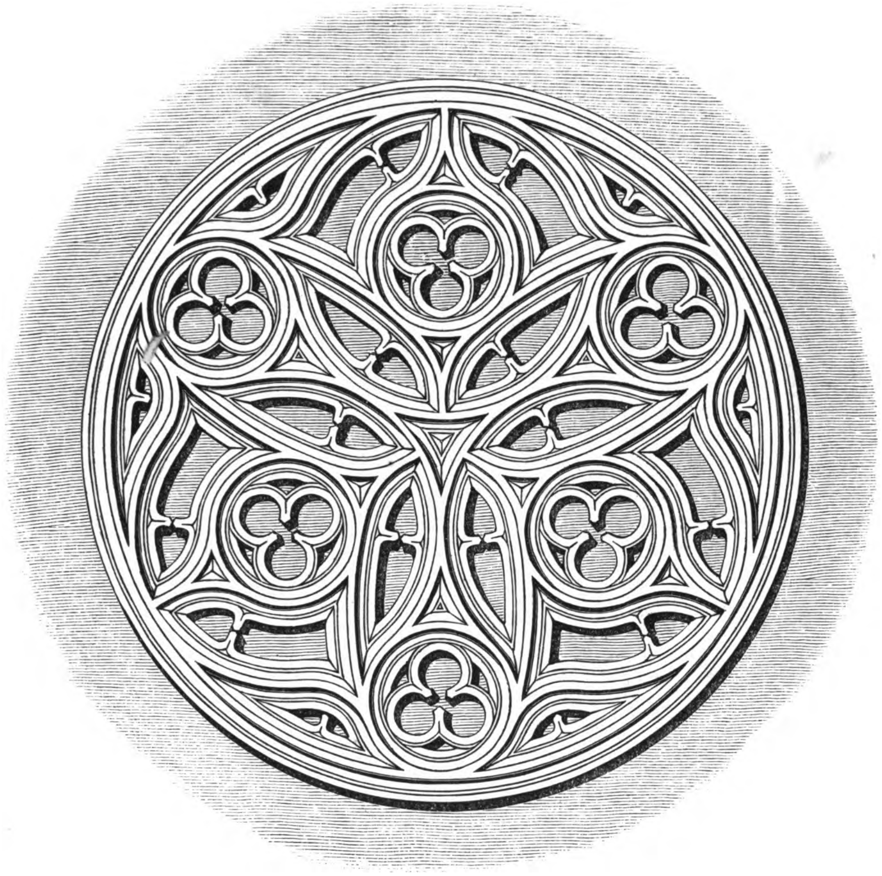
XXXIII.

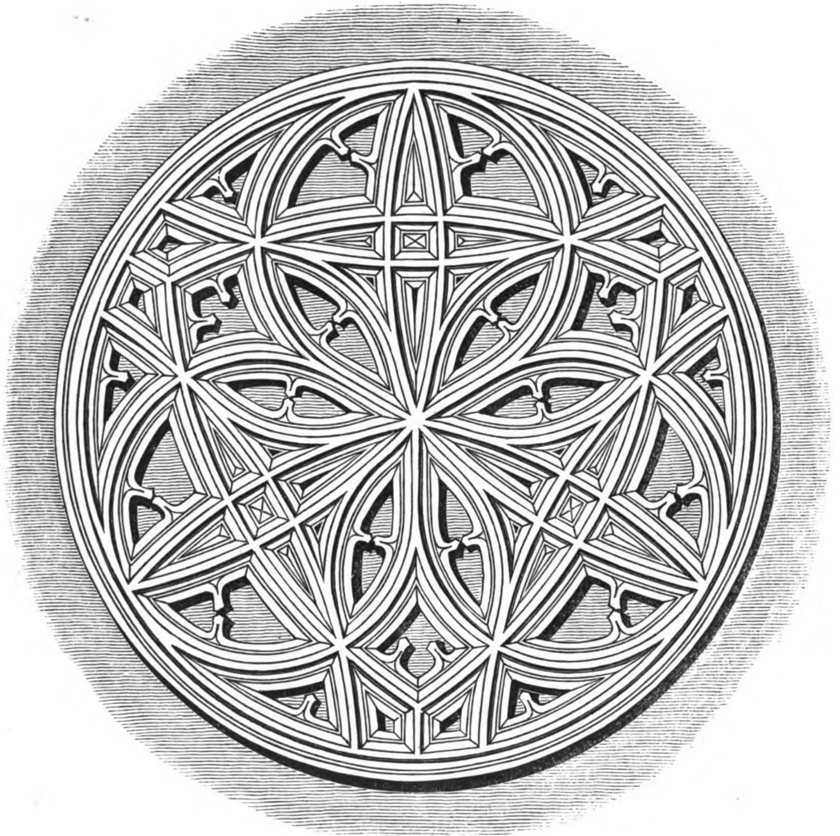


XXXIV.

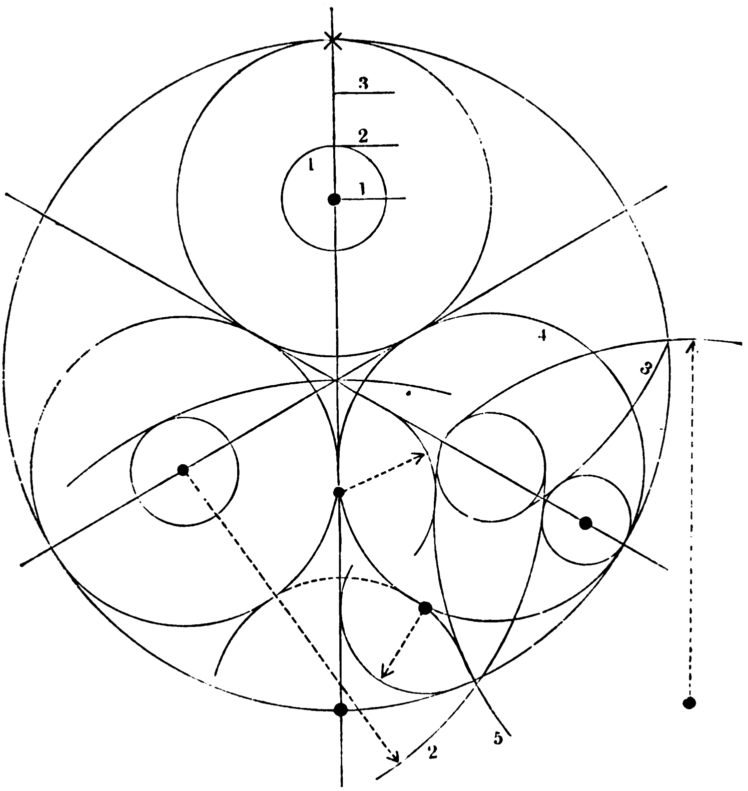


The curves 1. to 4. are repetitions.

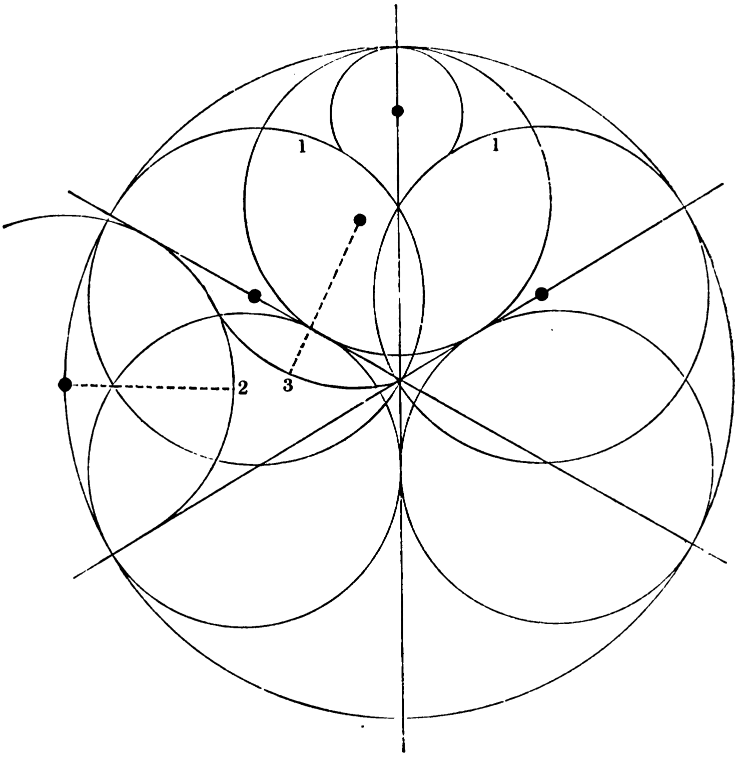




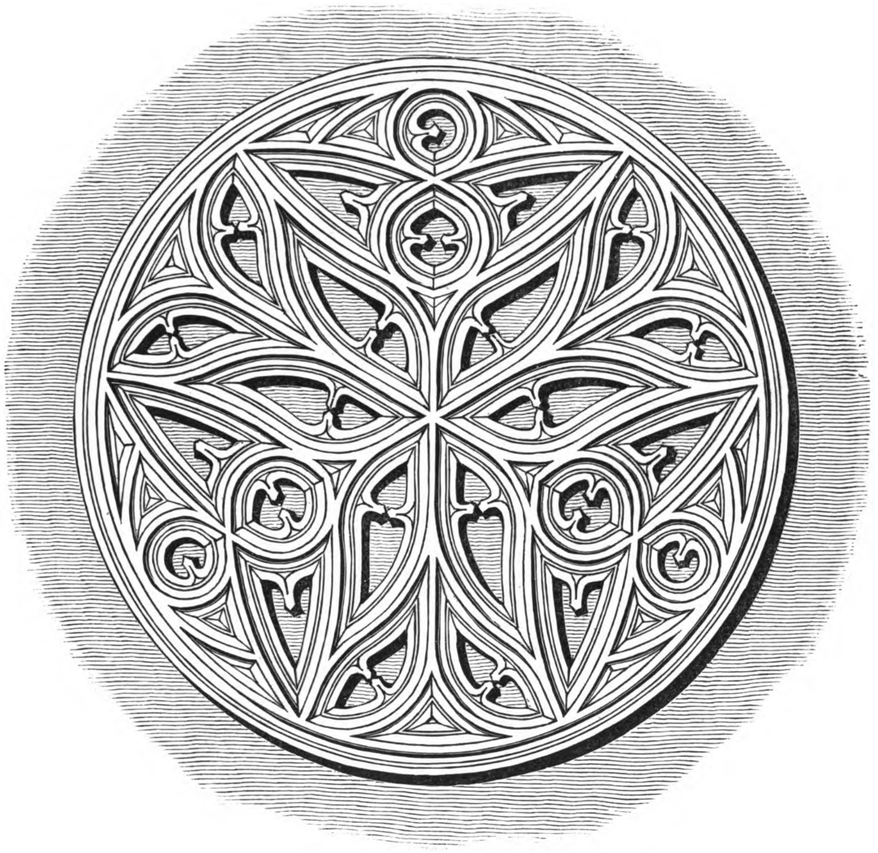
XXXV.

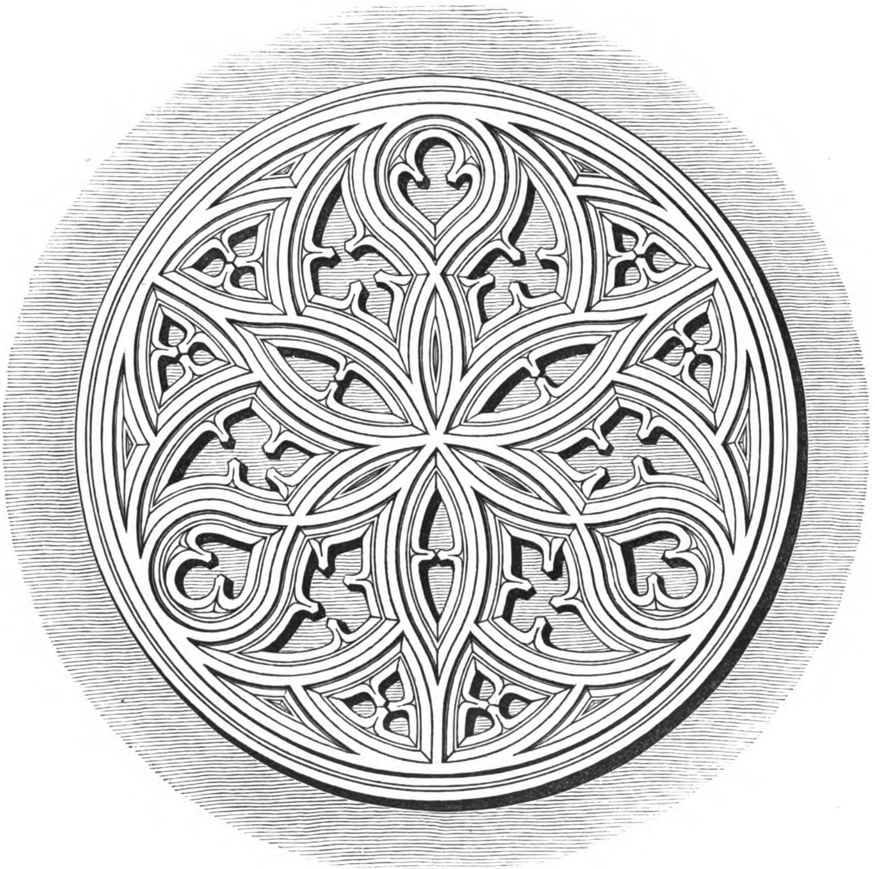


XXXVI.

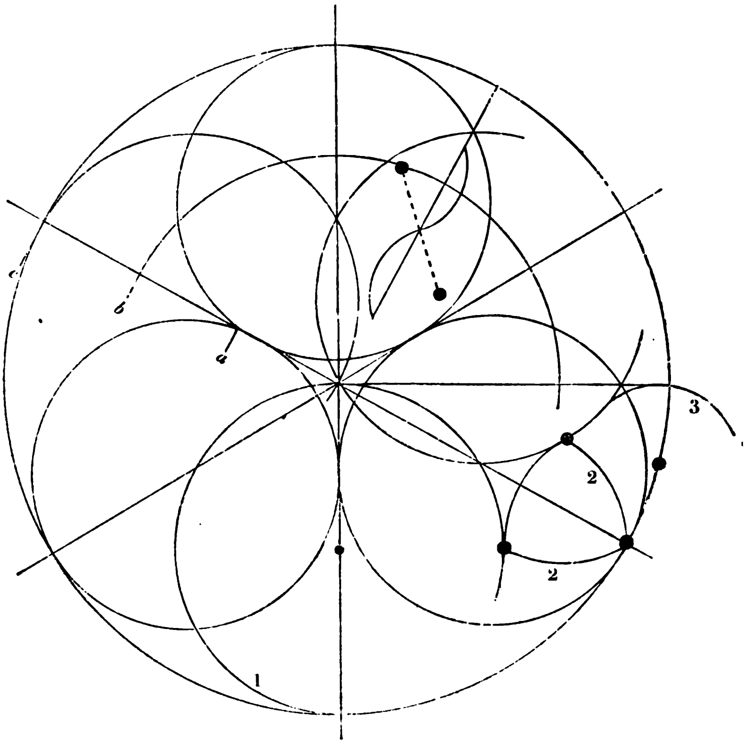


It is not the number of different curves used that always produces the best patterns; thus, the principal frame of this pattern is the repetition of the circles 1.





XXXVII.



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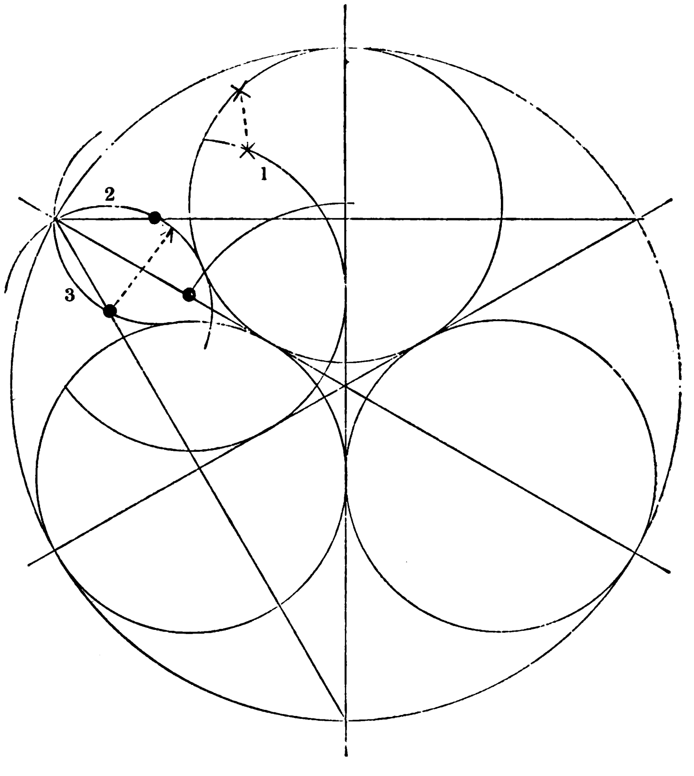

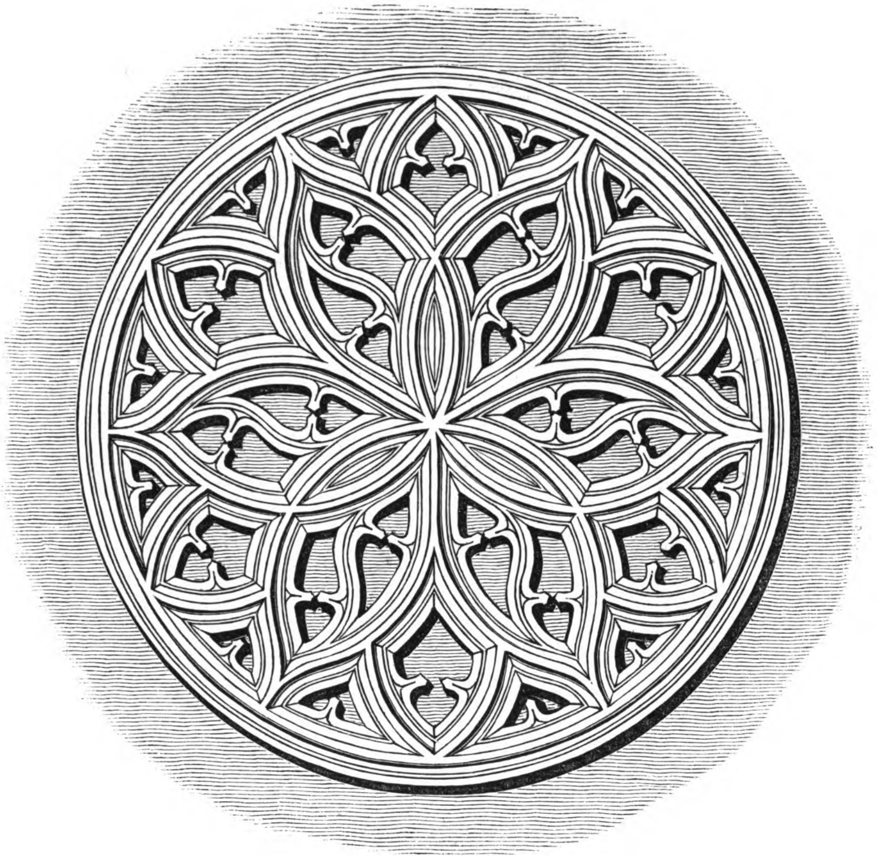

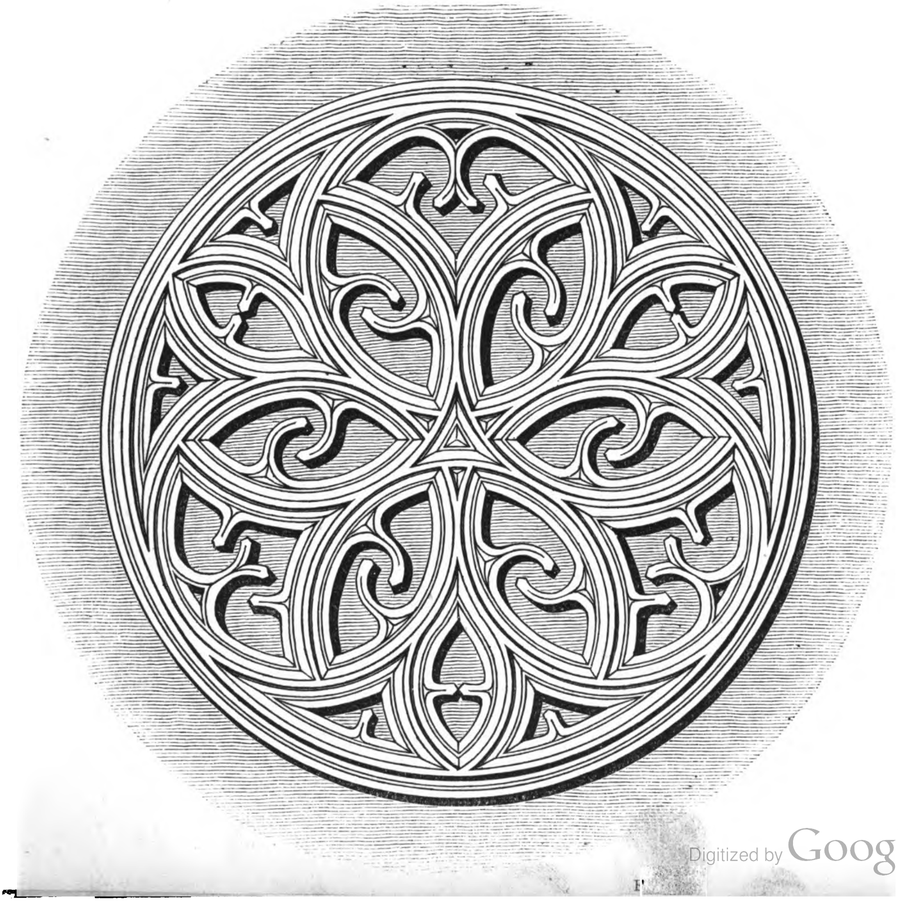

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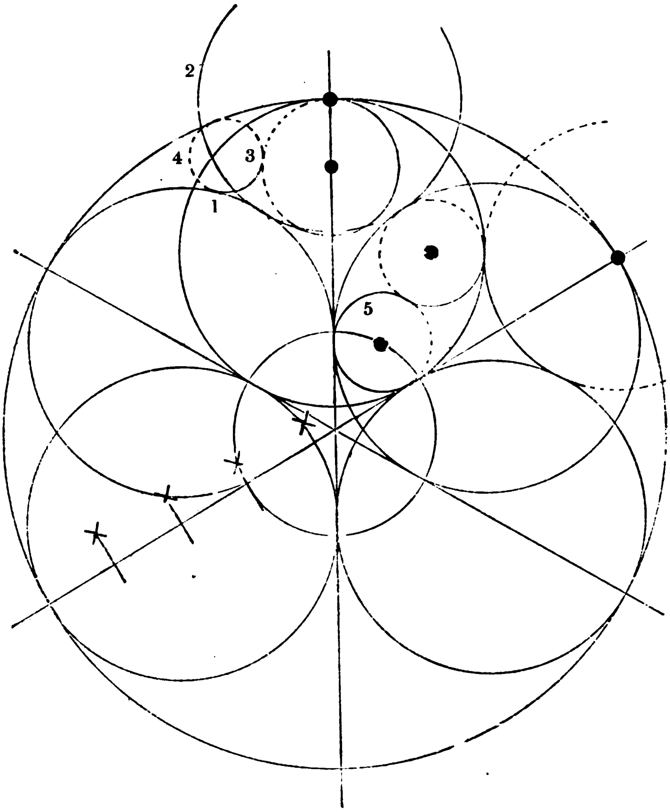
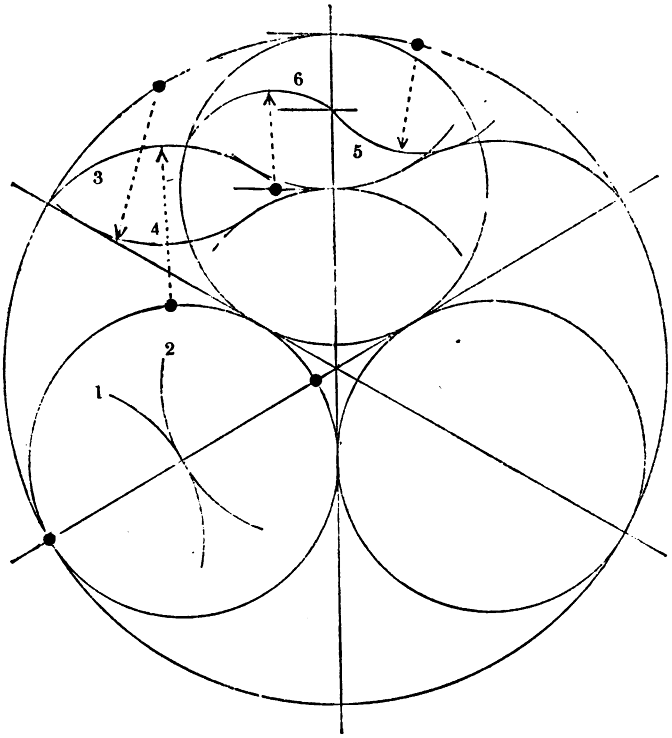
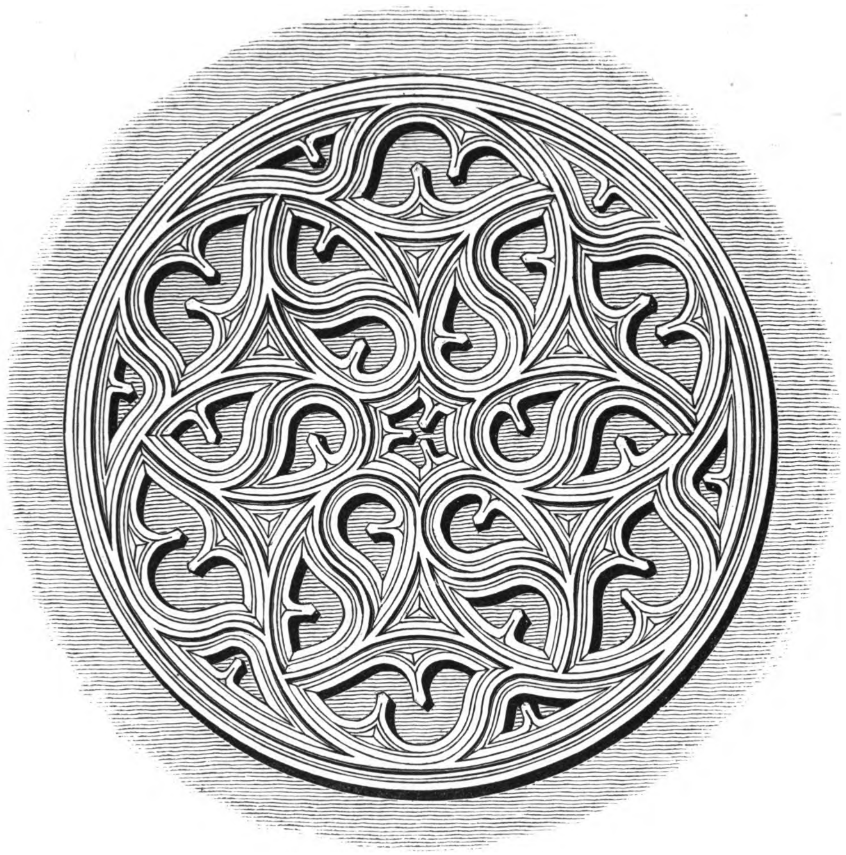
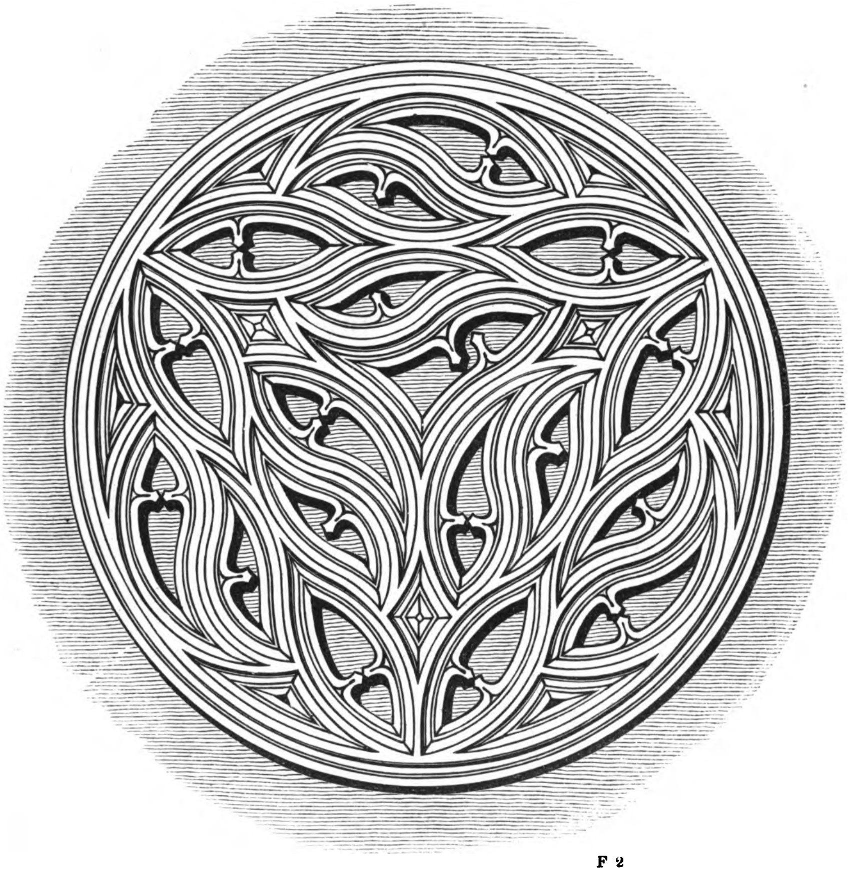


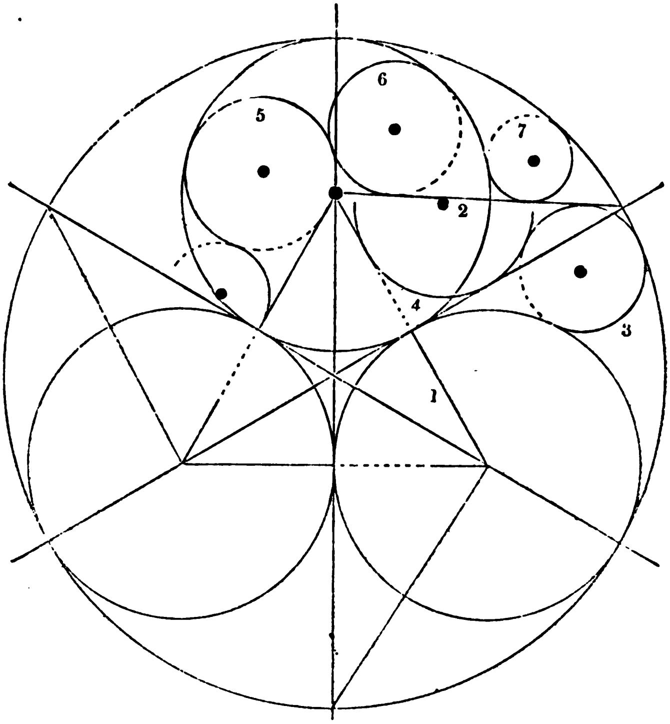
XL.



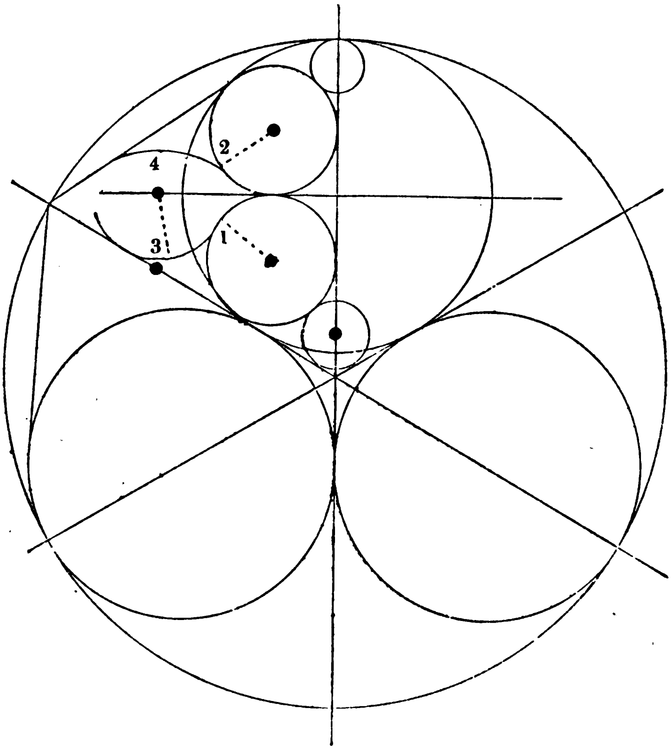


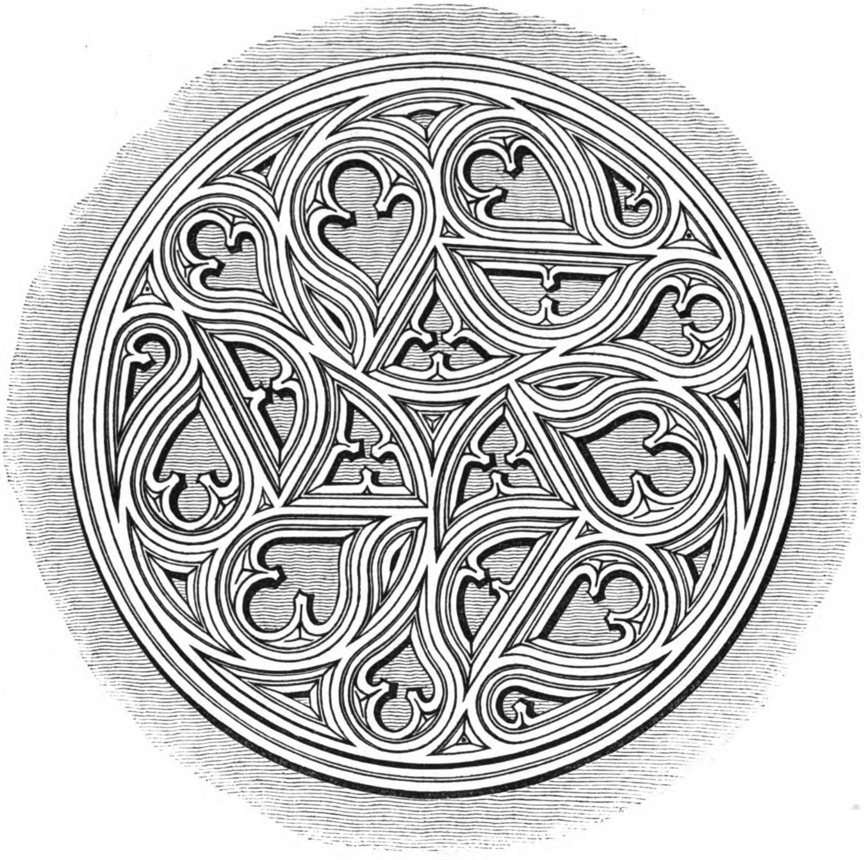


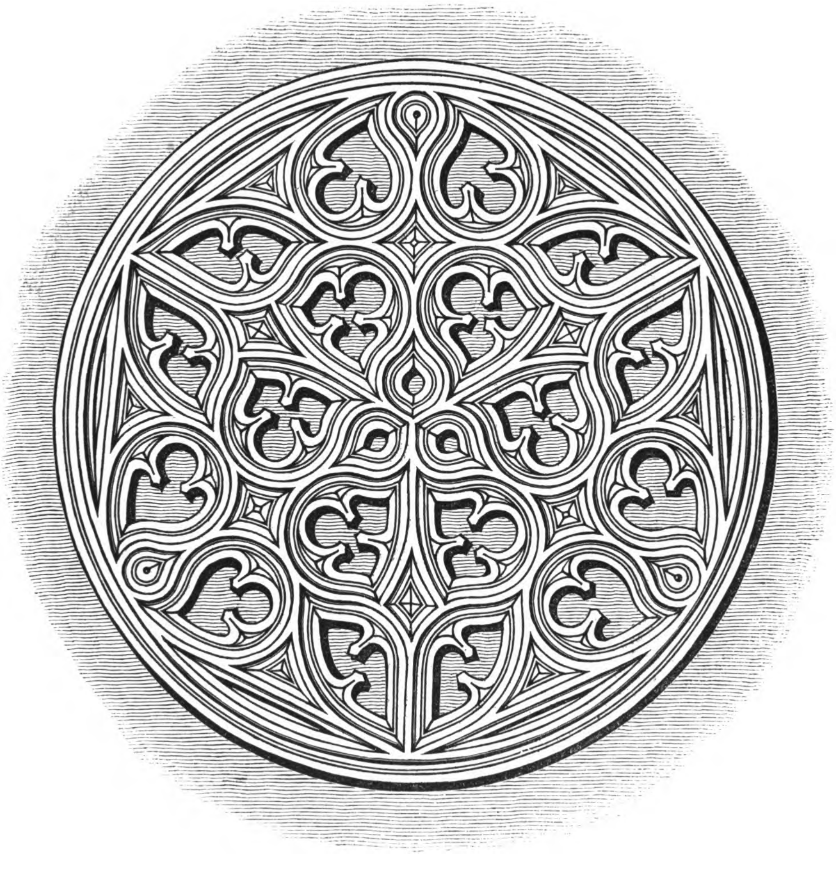
XLI.



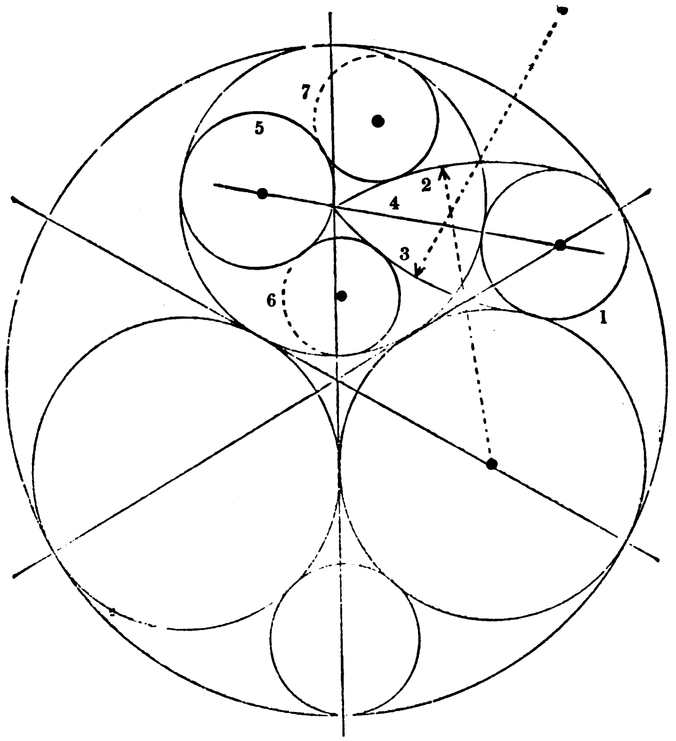
XLII.



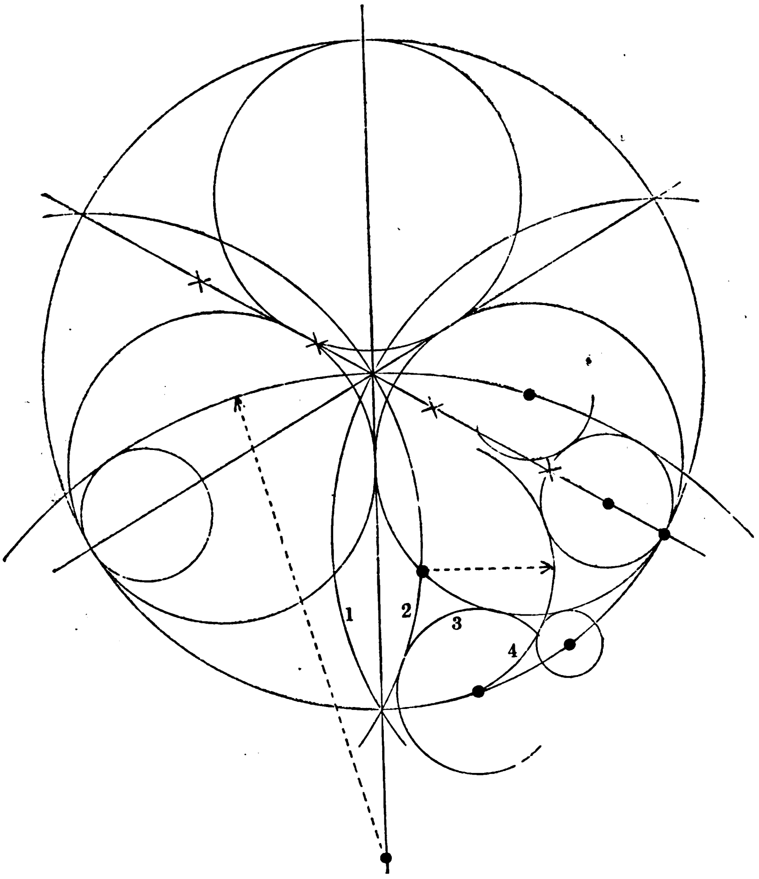


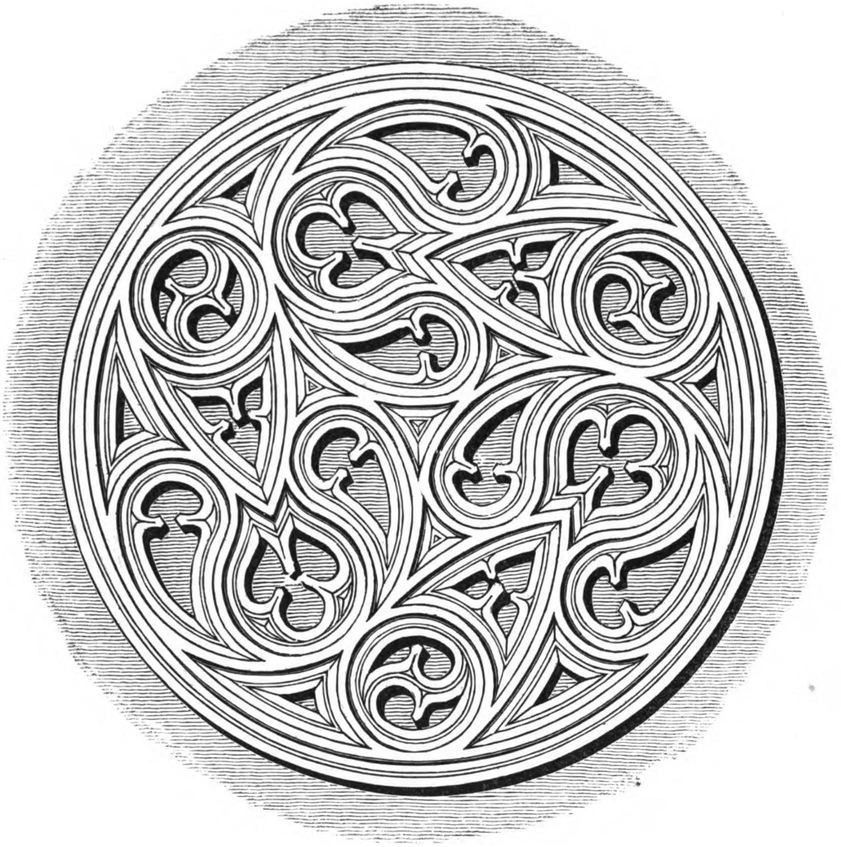


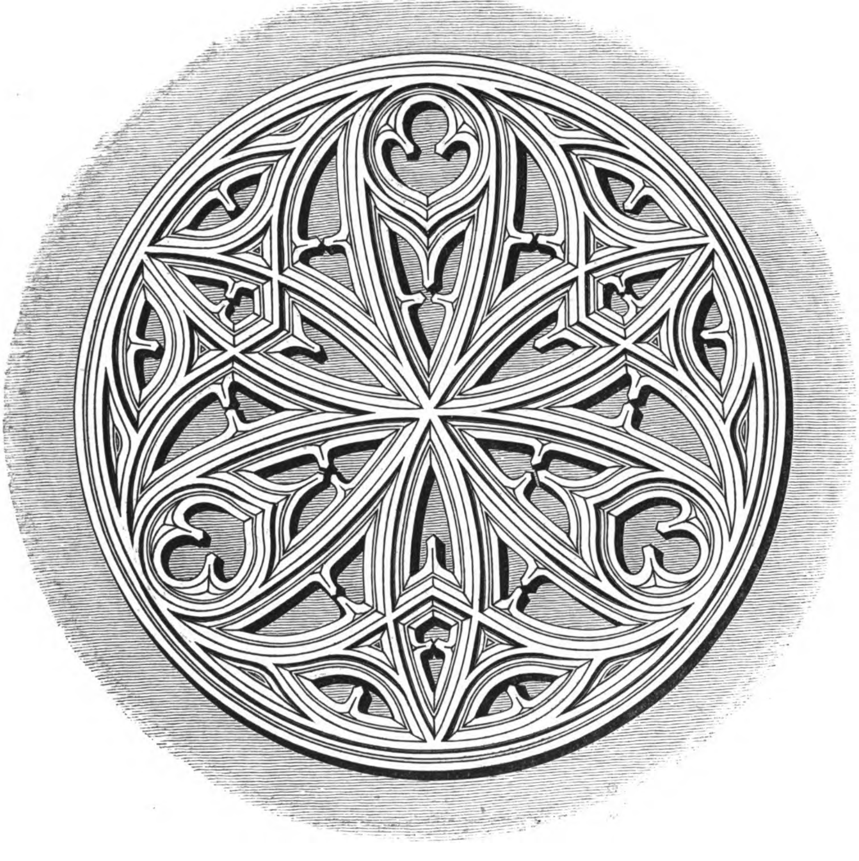
XLIII.



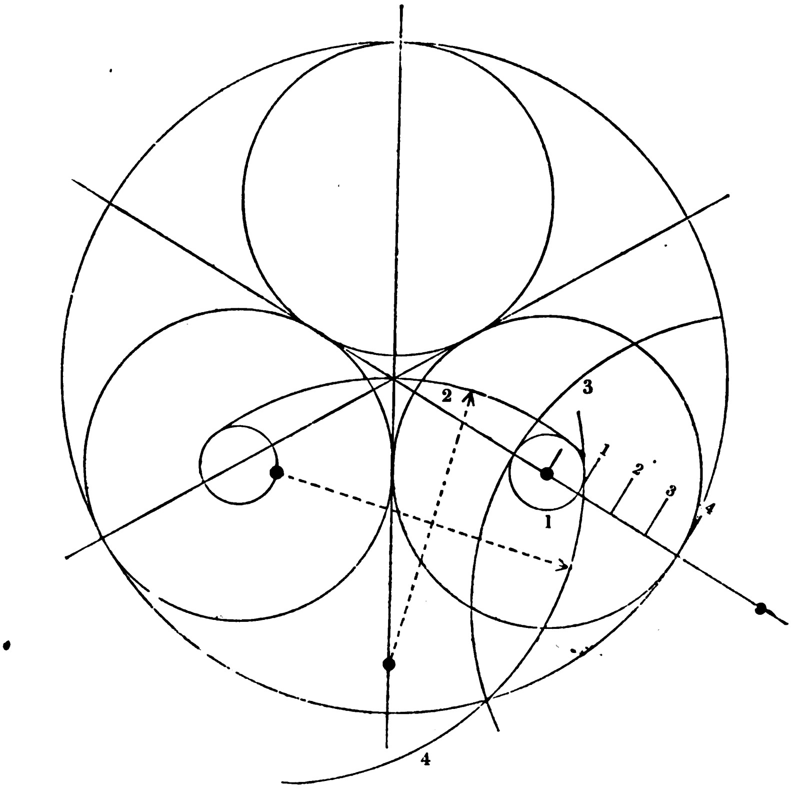
XLIV.



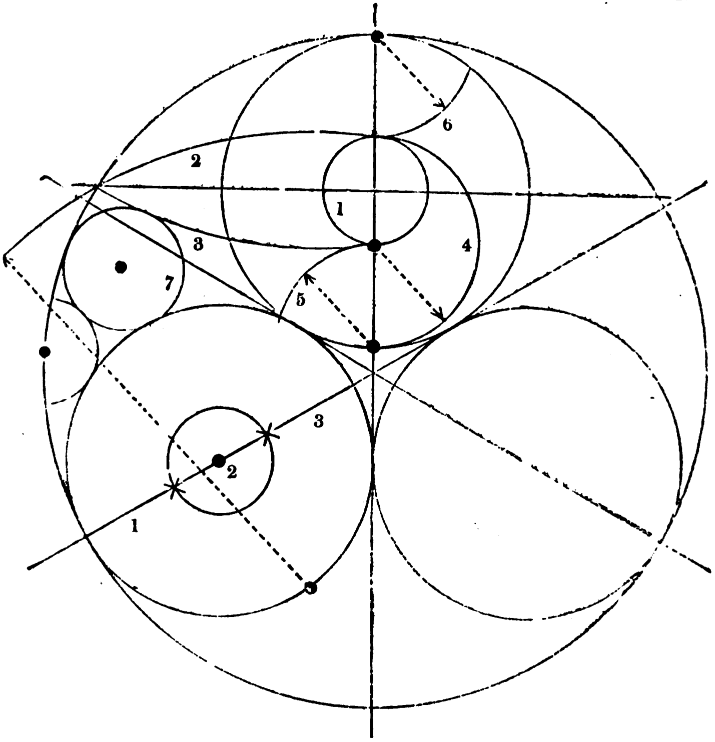




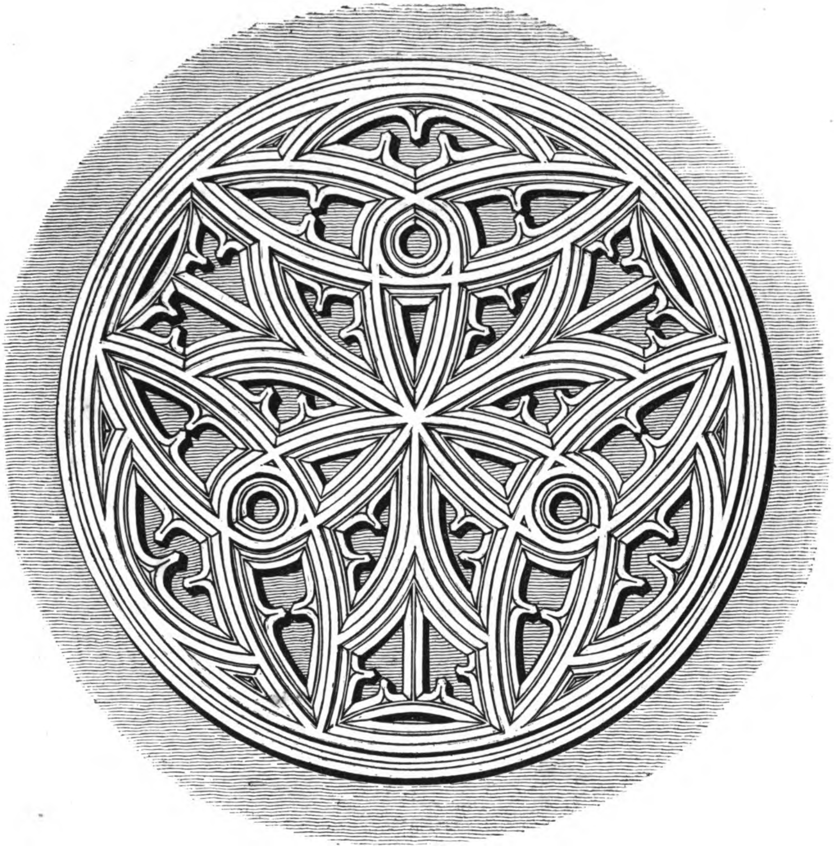
XLV.

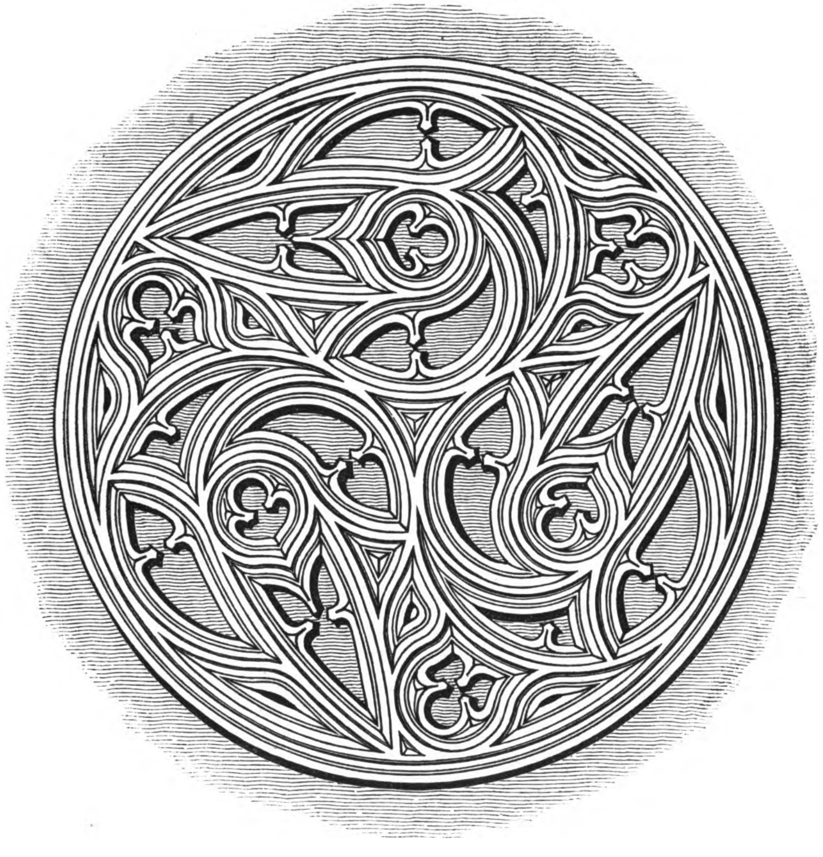


XLVI.

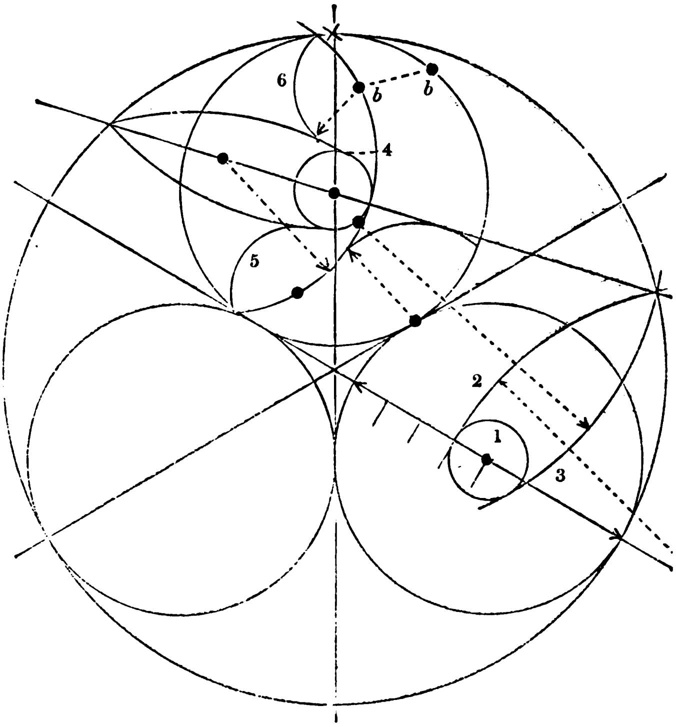


6
2
1
3
4
7
5
3
2
1

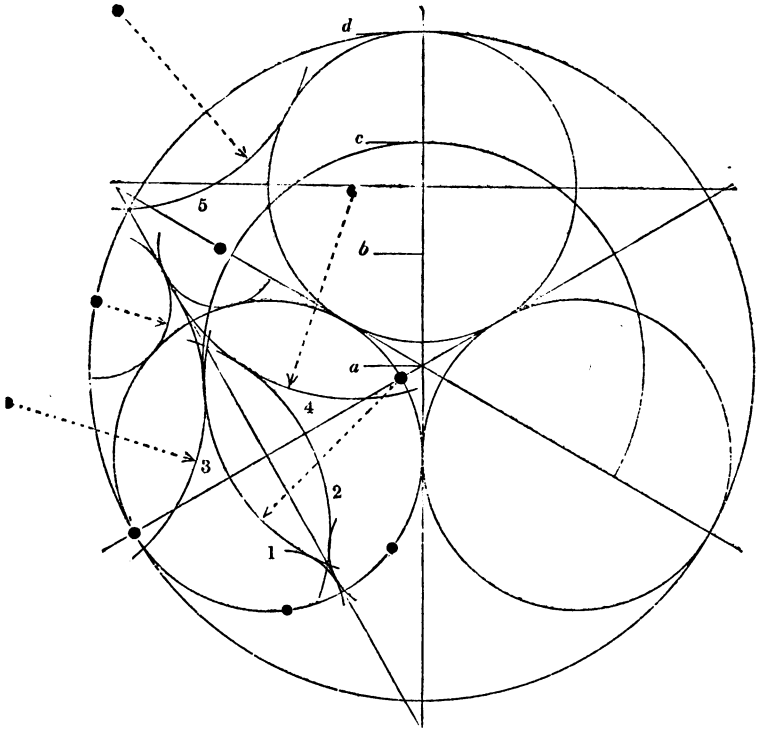




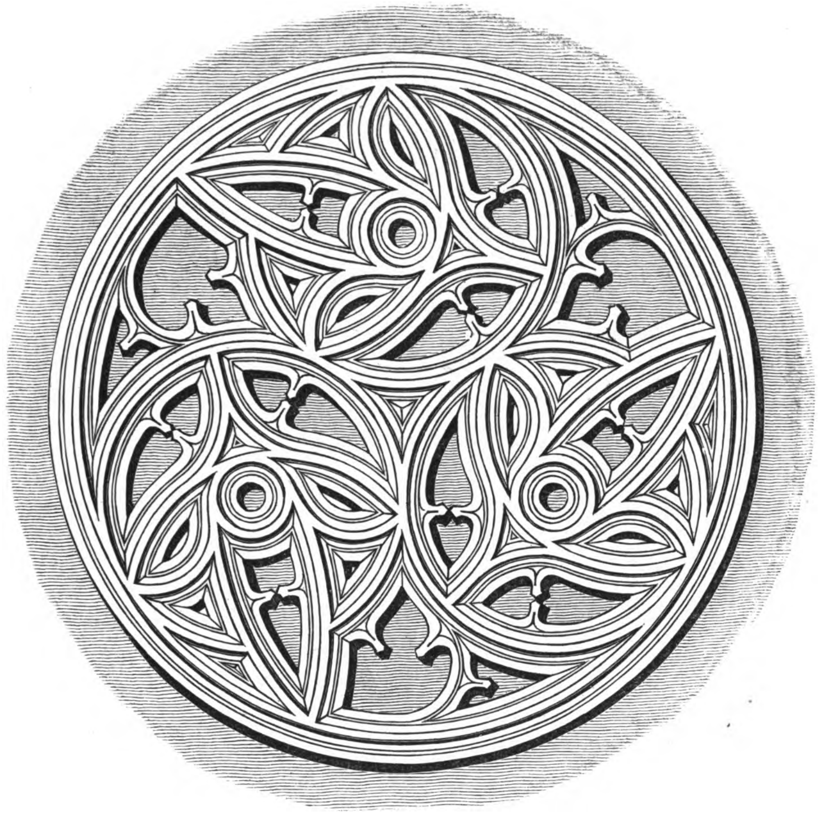
XLVII.

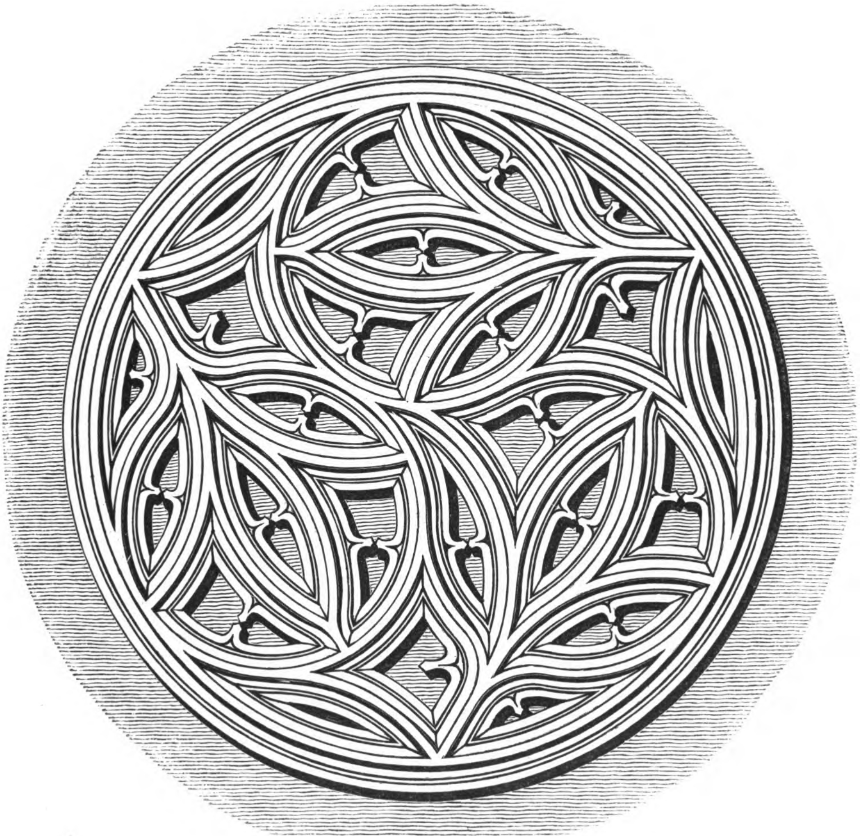


XLVIII.

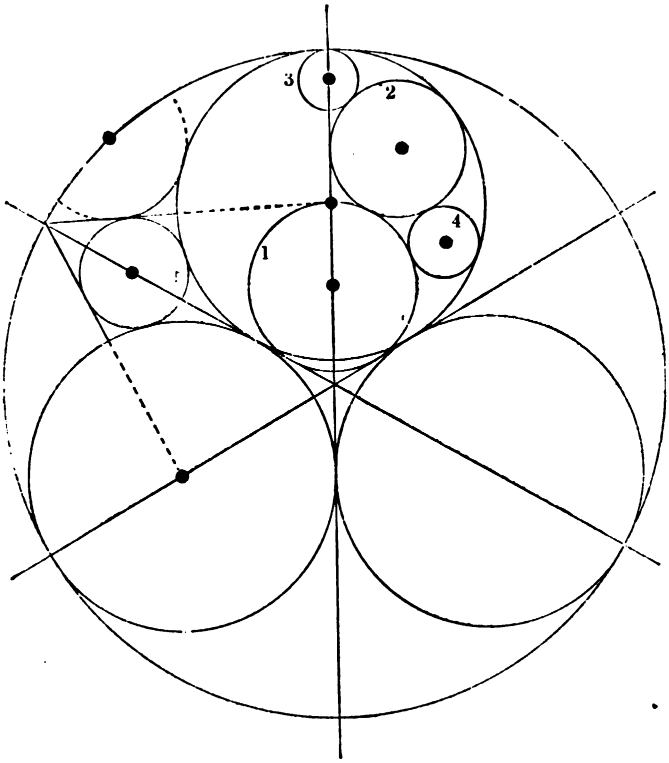


This example is almost wholly the repetition of one curve. Thus, Nos. 1 to 5 are all of equal radius.

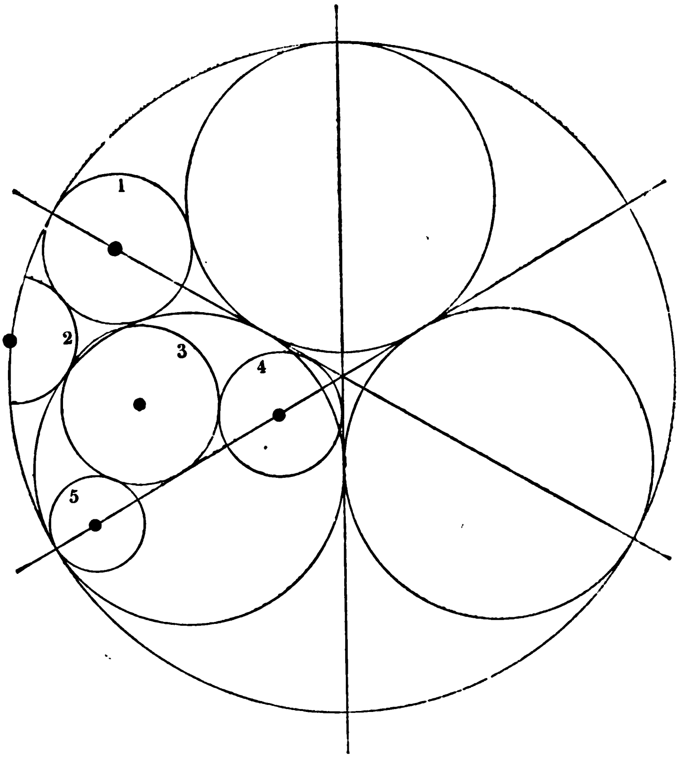


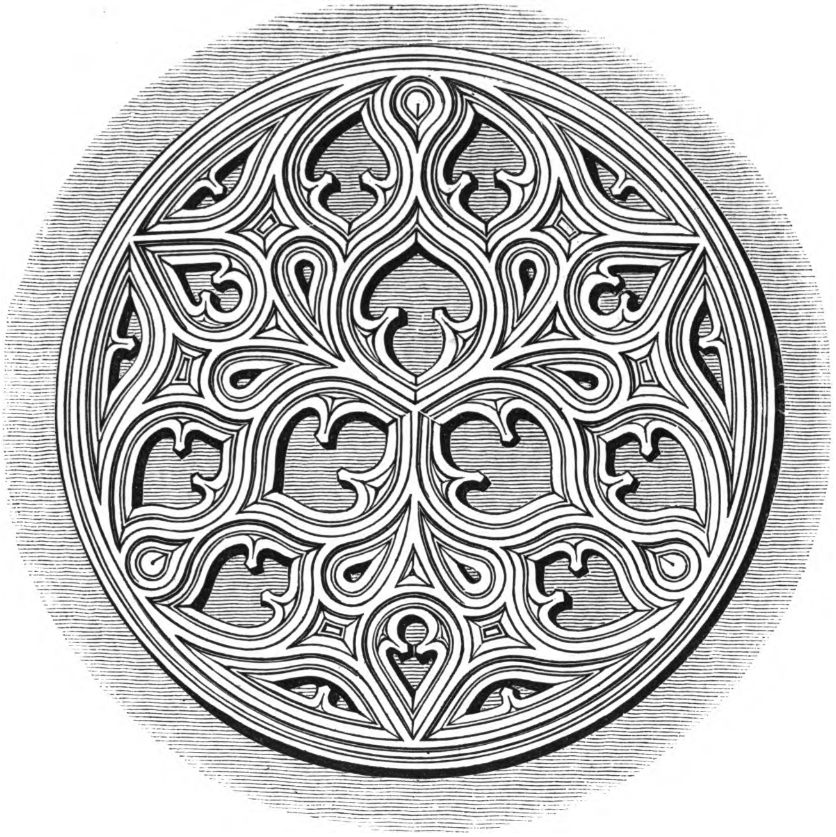


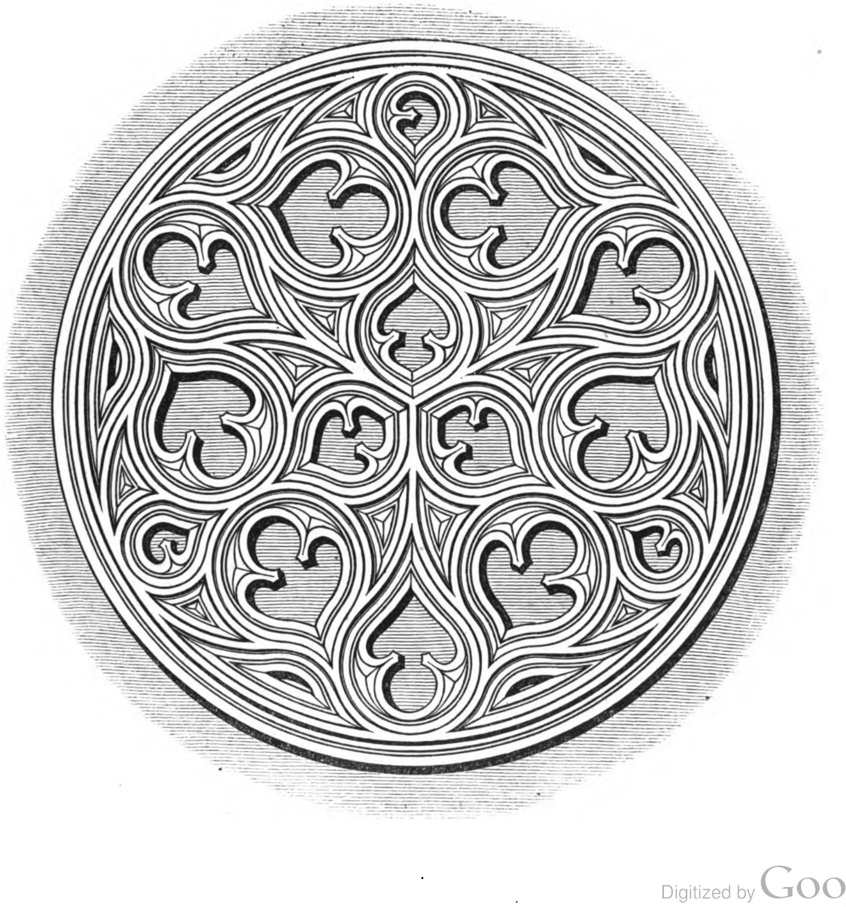
XLIX.



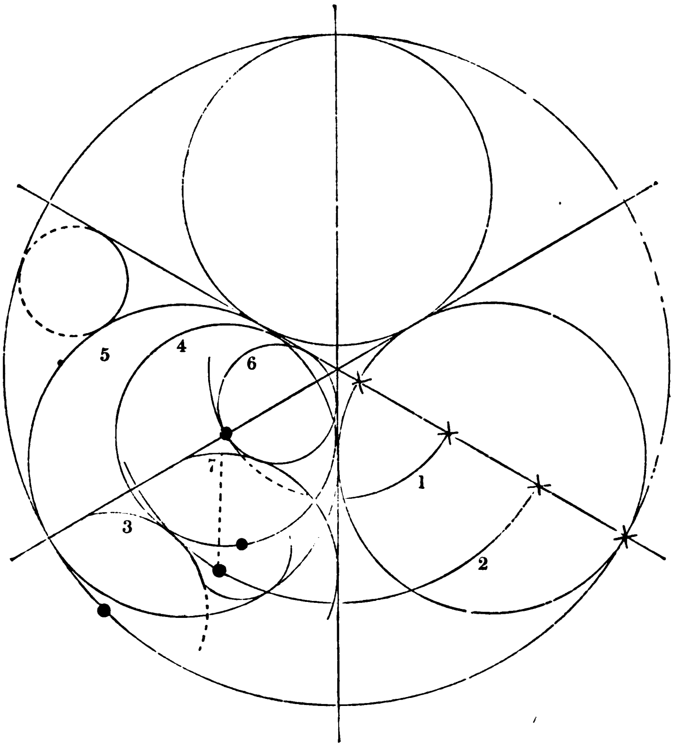
L.



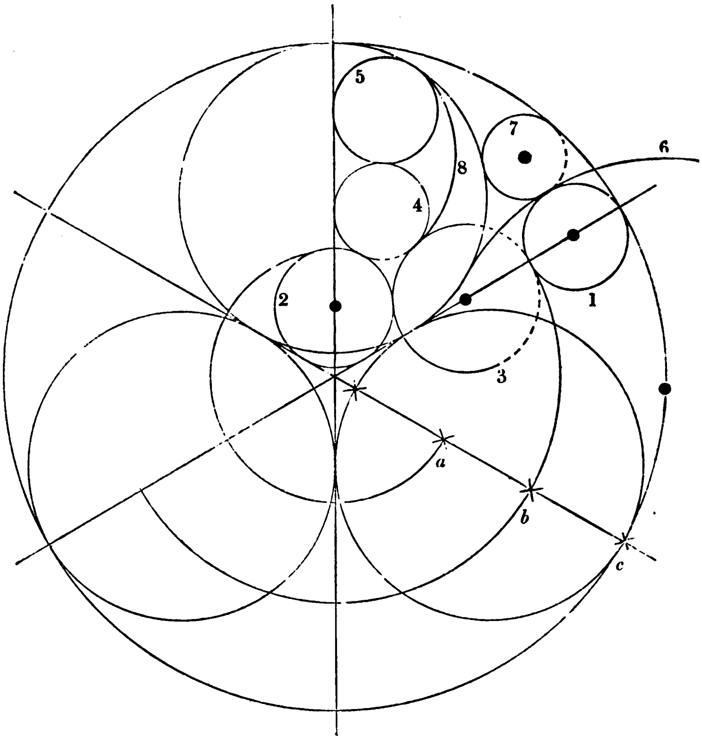




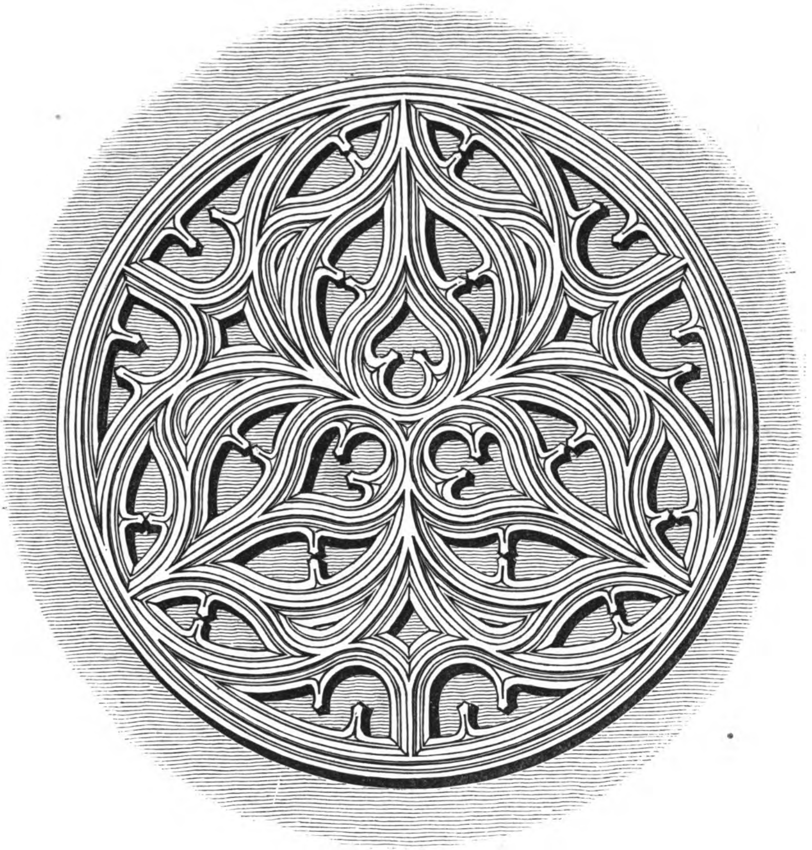
LI.

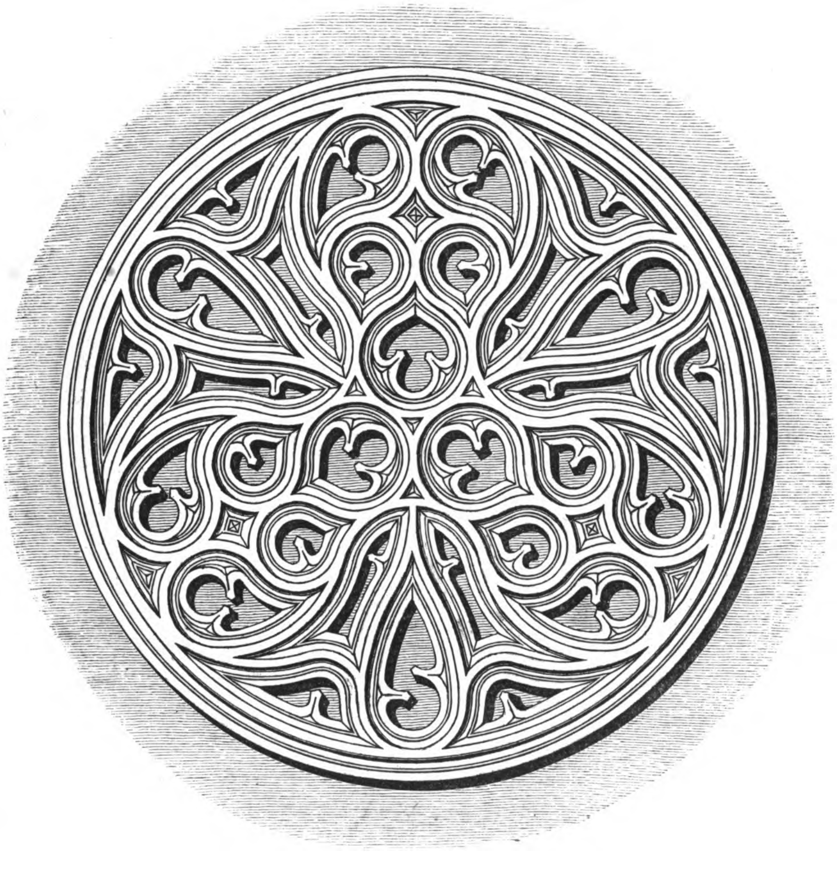


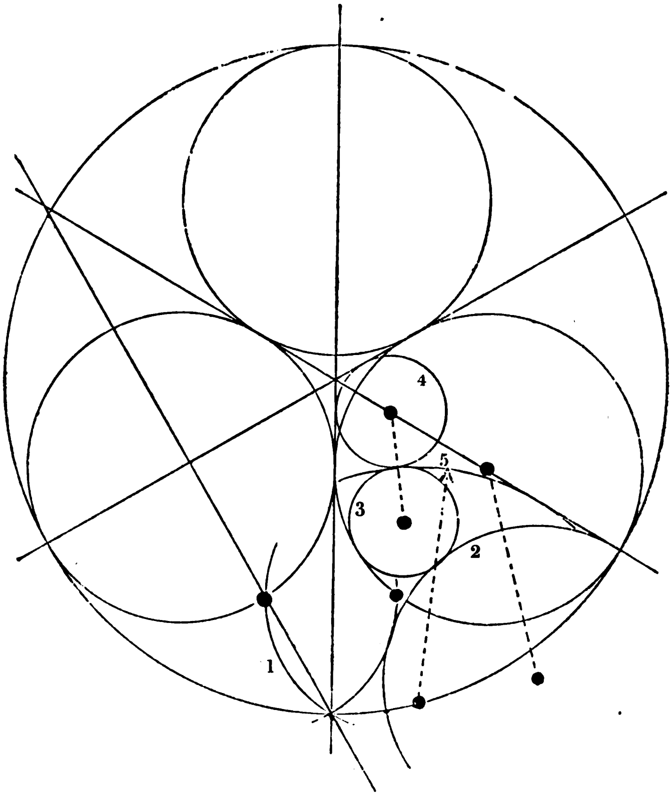
LII.



5
7
6
8
4
2
1
3
a
b
c

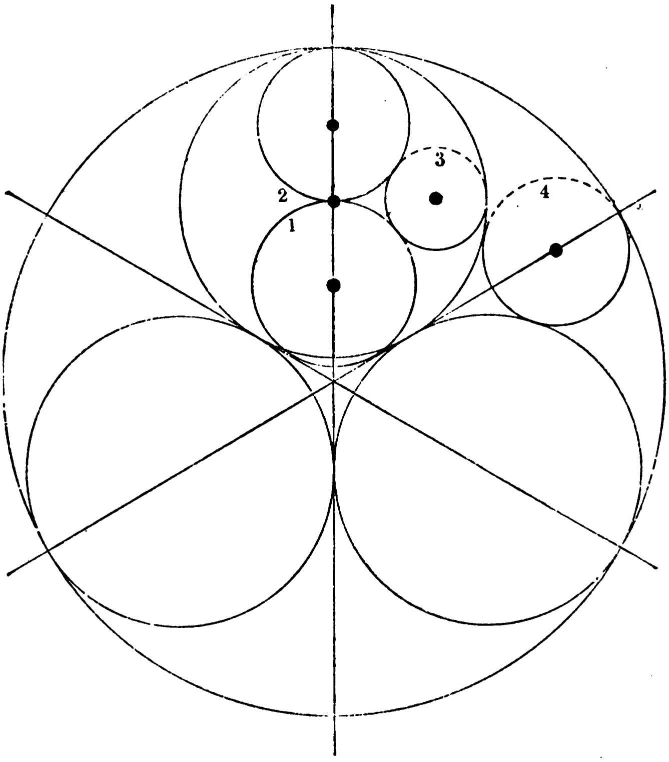


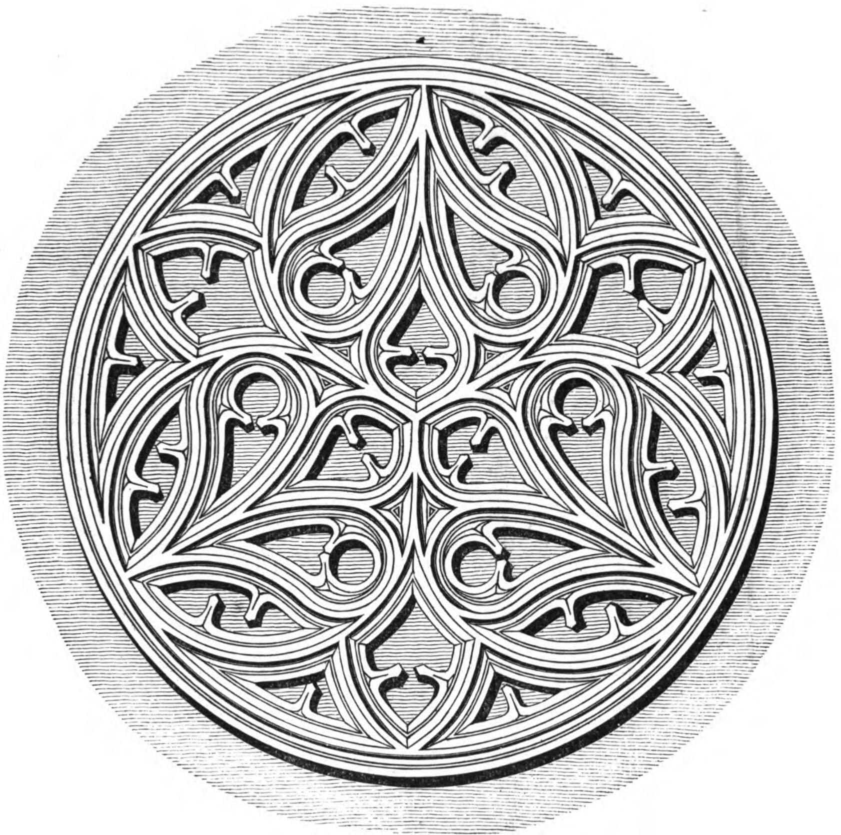


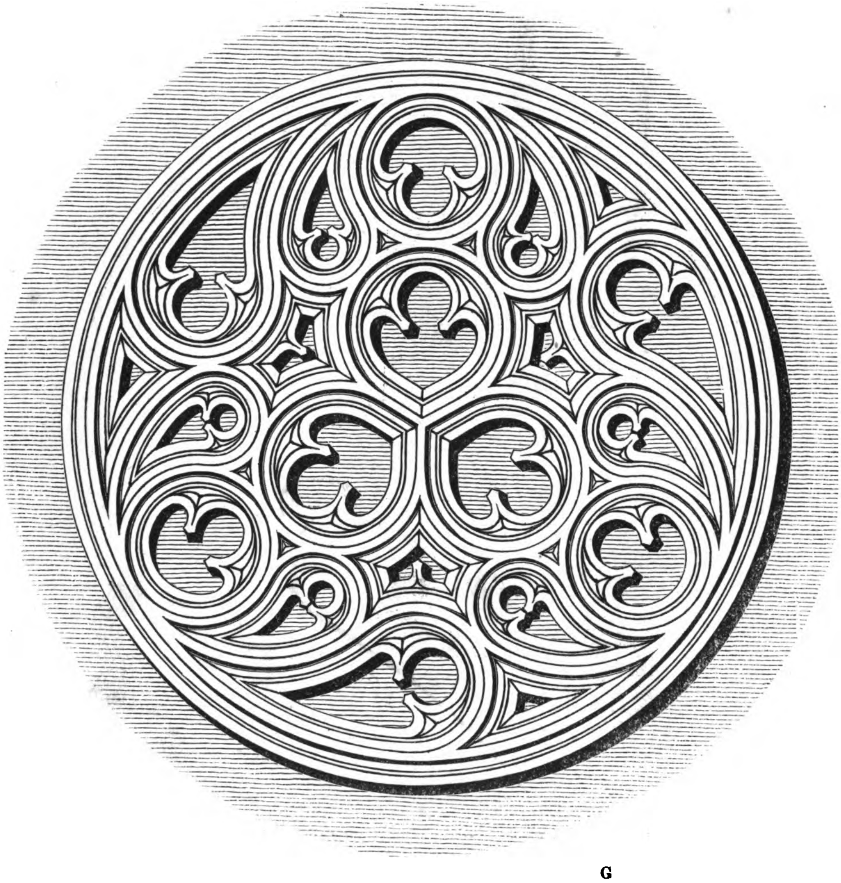


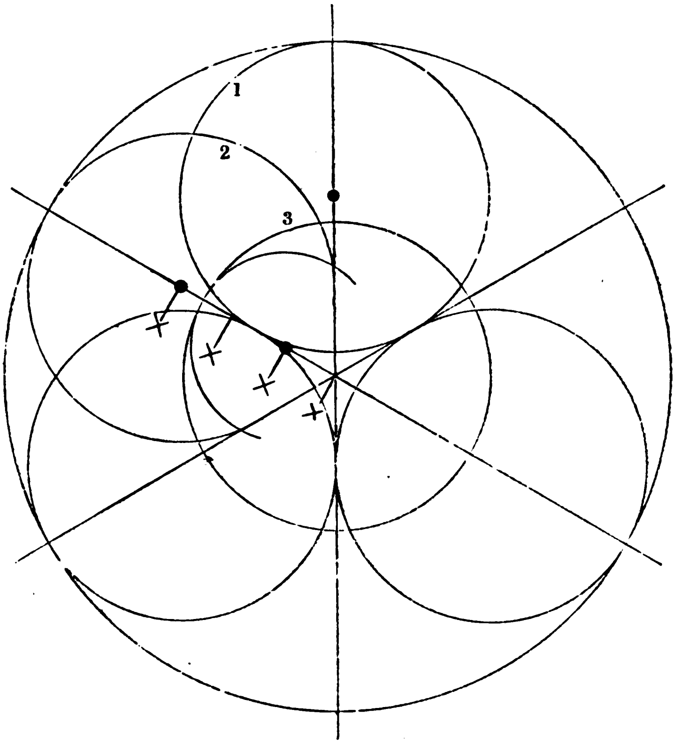
Here the circles 3 and 4 are of equal size.

LIV.

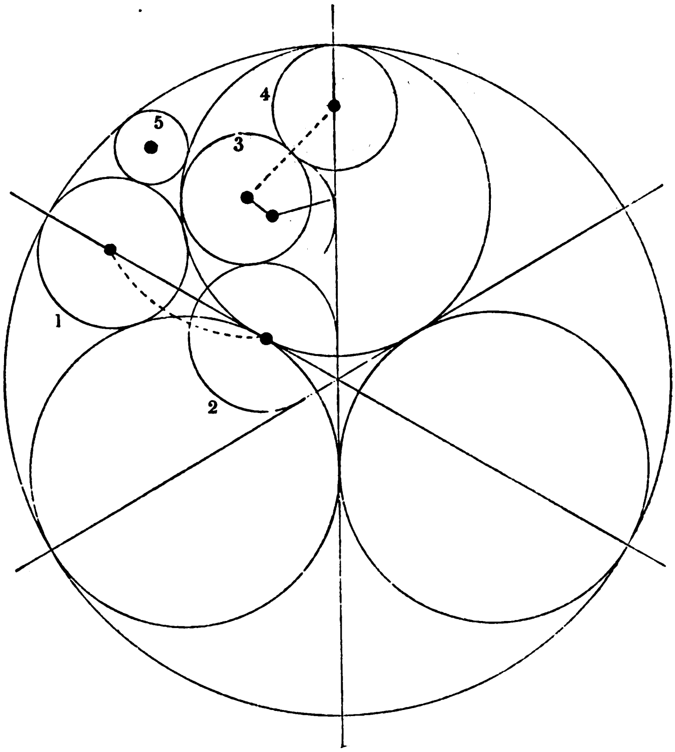




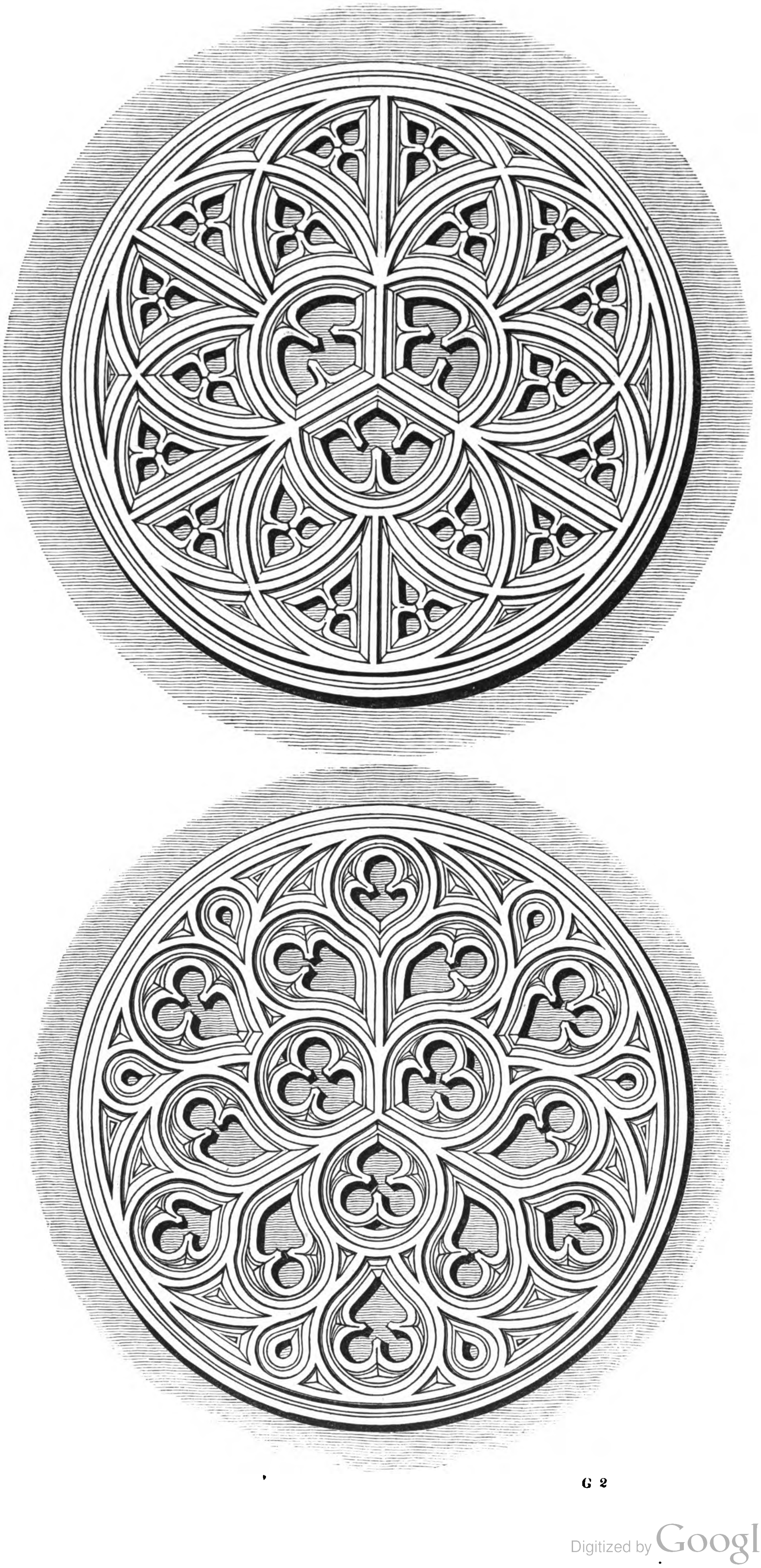




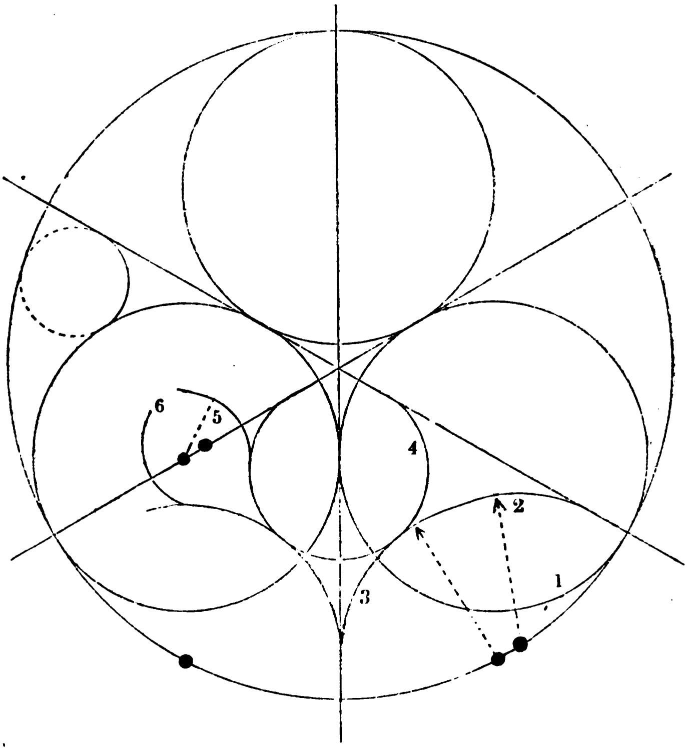
Here the circles 1 and 3 are repetitions.



In this example No. 2 is a repetition of 1, and 3 and 4 are equal circles In the minor tracery all the foil heads are repetitions of one circle.

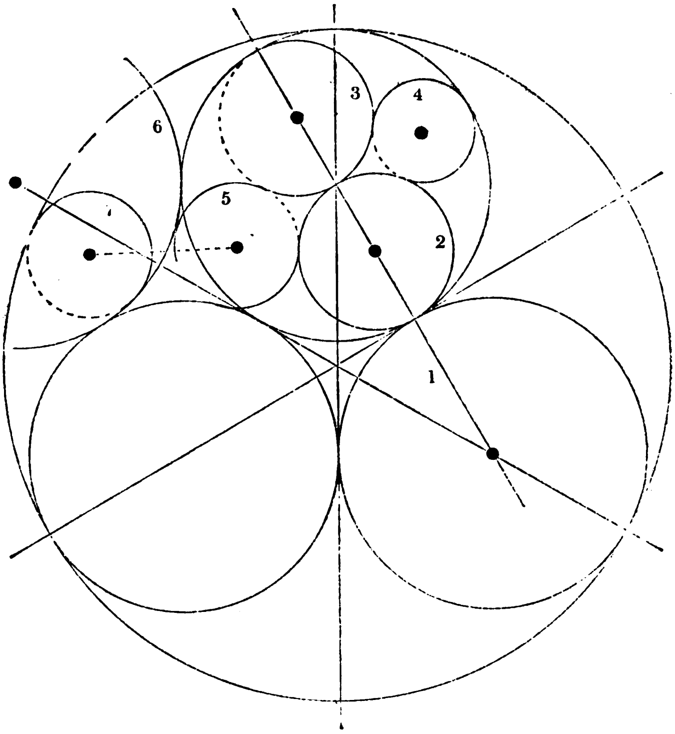


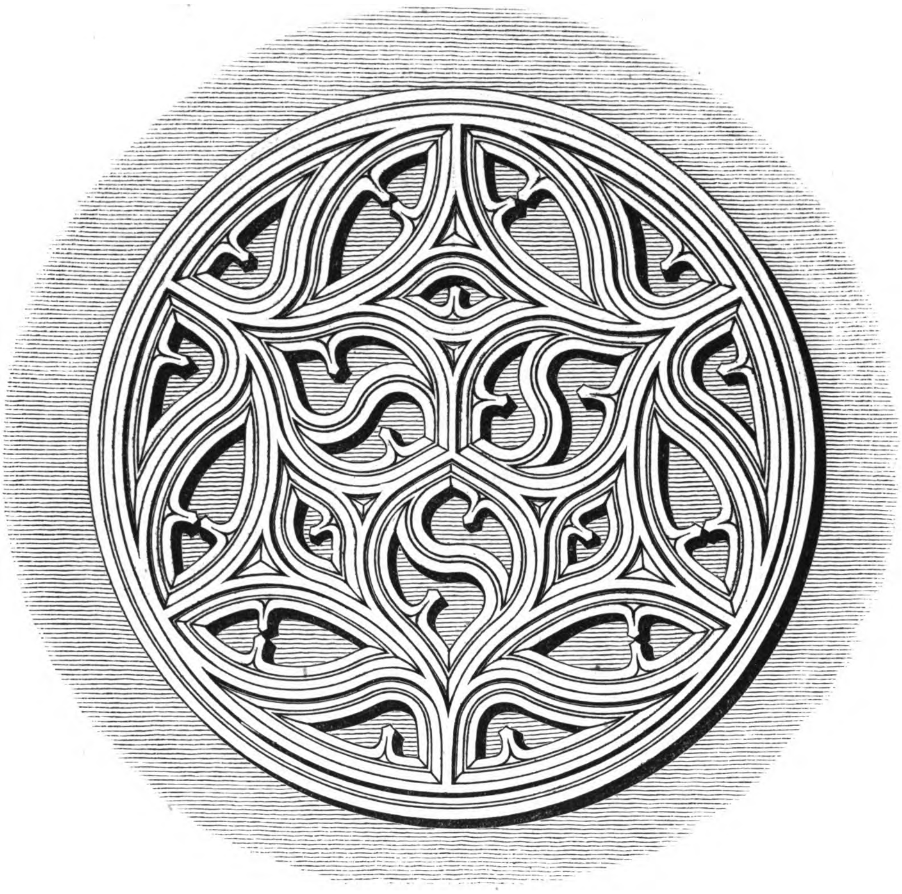
LVII.

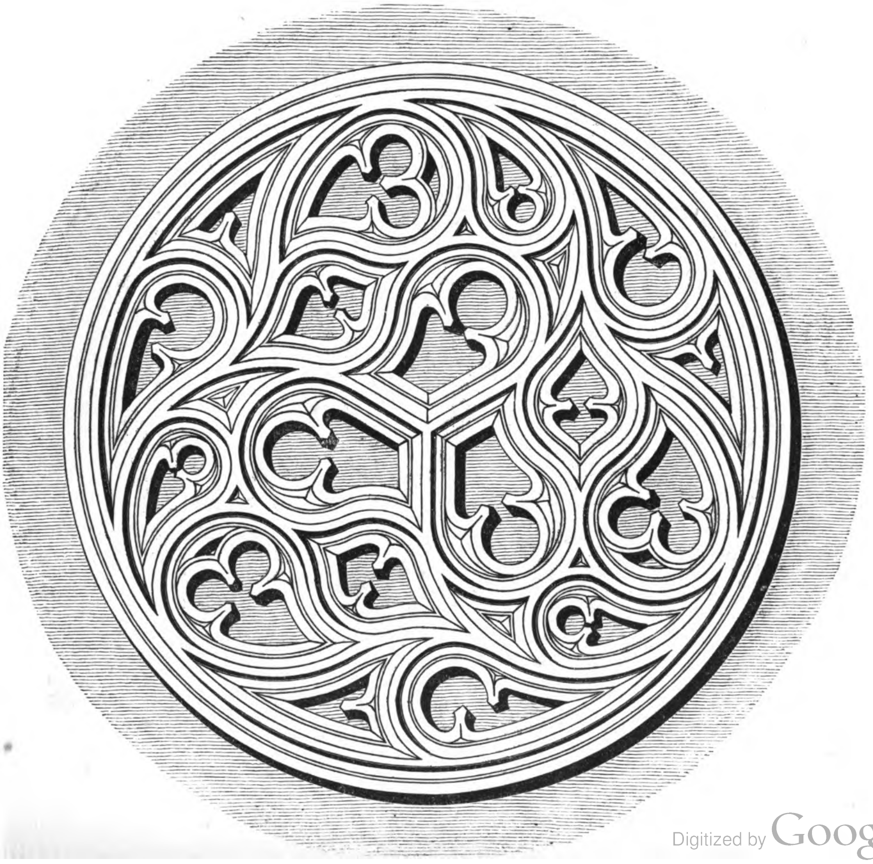


Numbers 1, 2, 3, are repetitions of one curve.

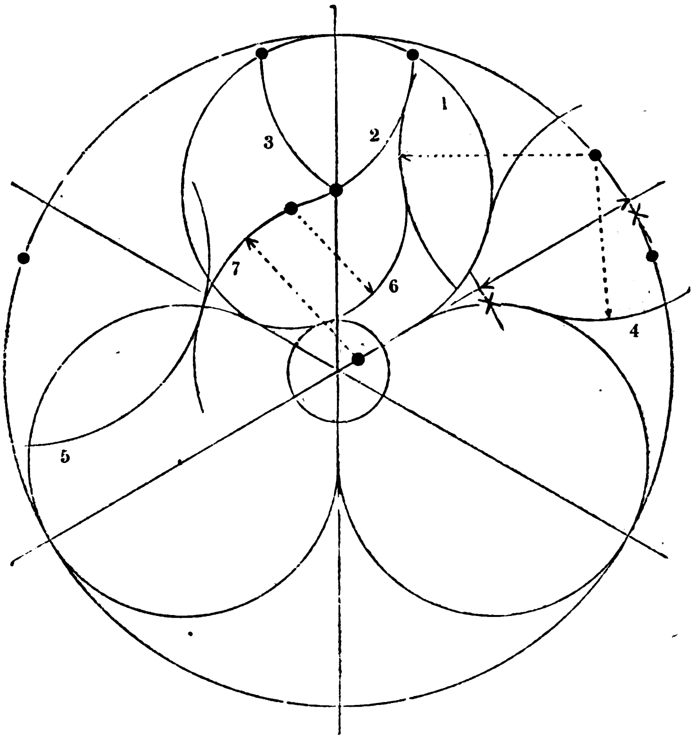
LVIII.





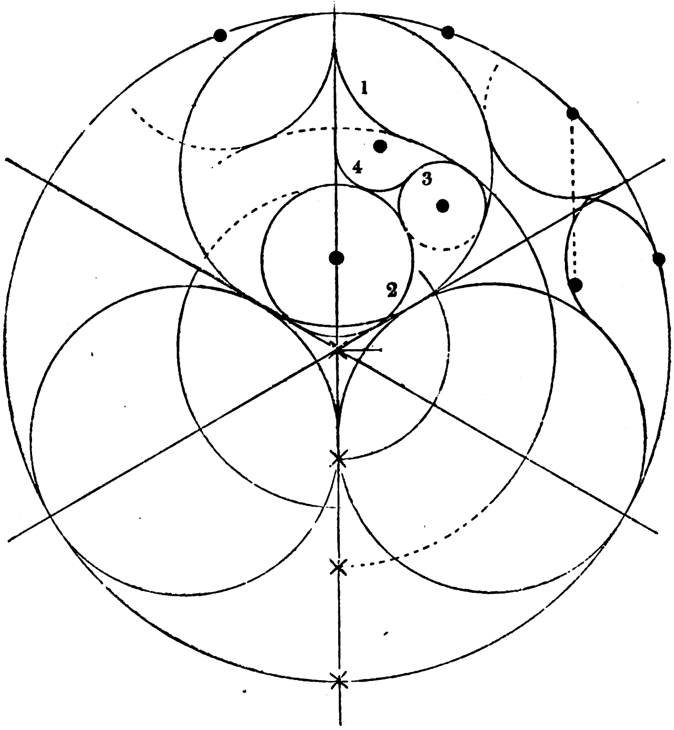


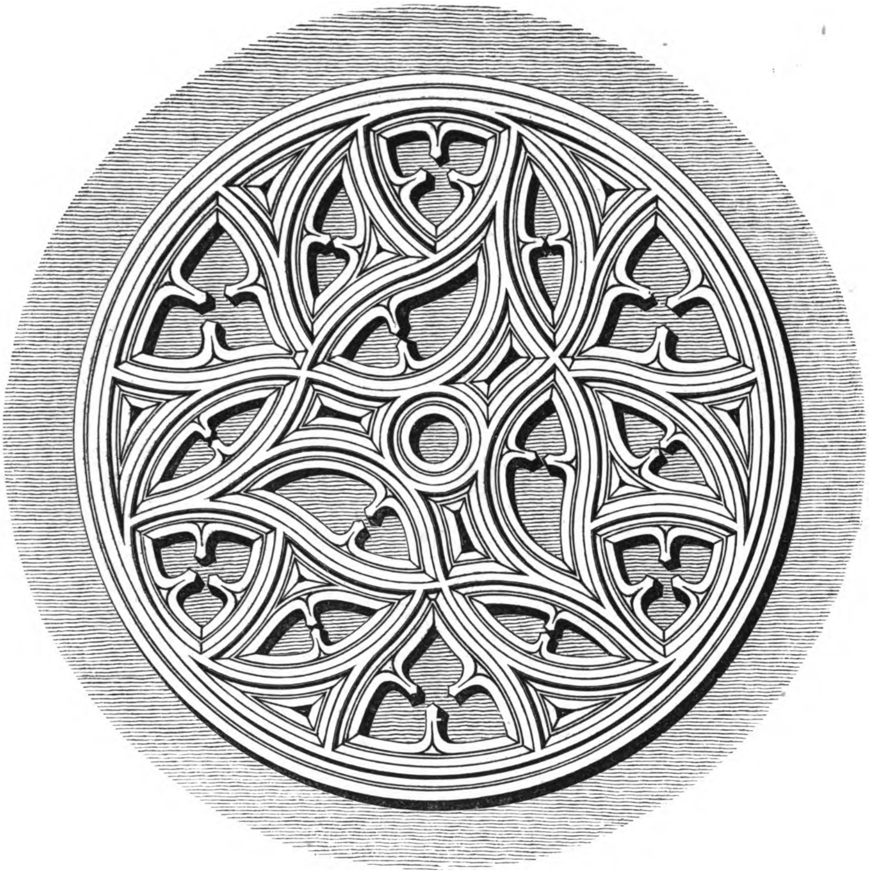
LIX.

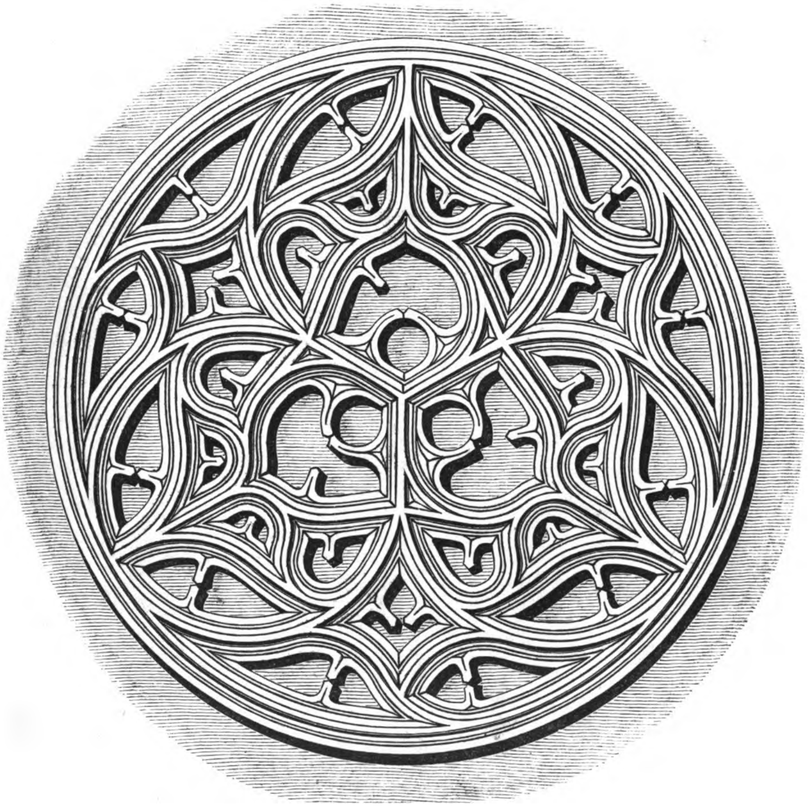


Numbers 1, 2, and 3 are repetitions.

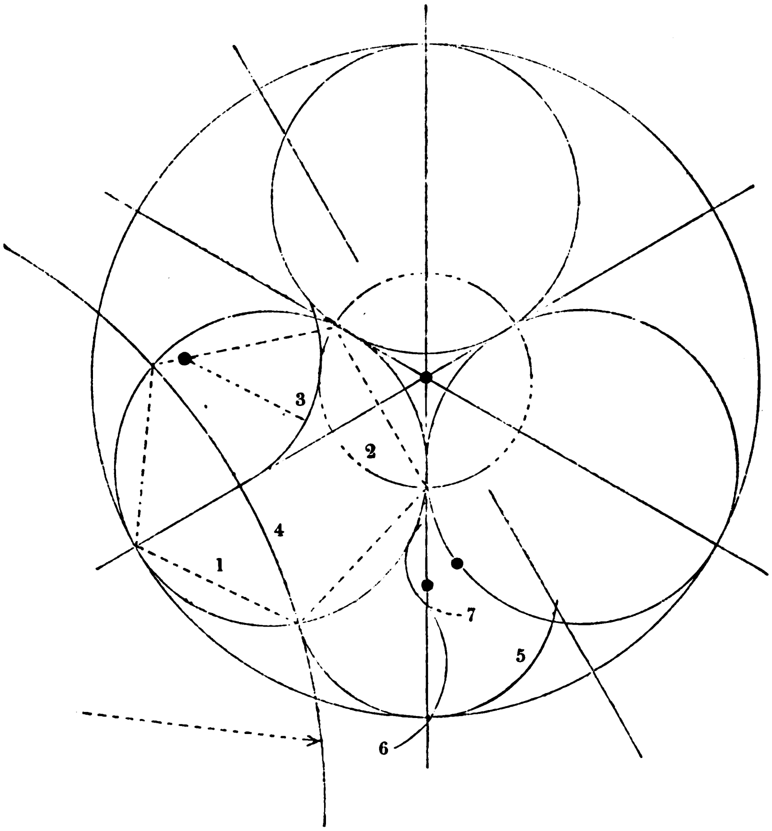
LX.



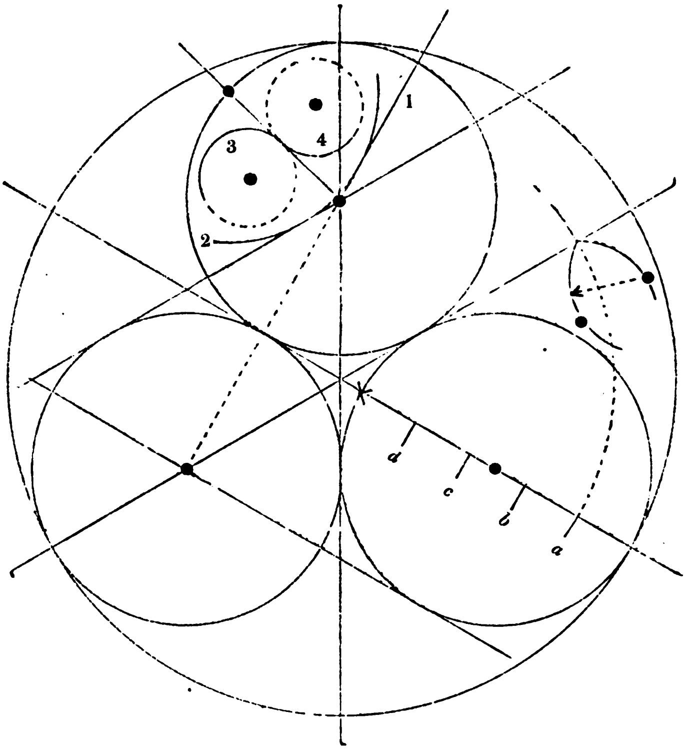


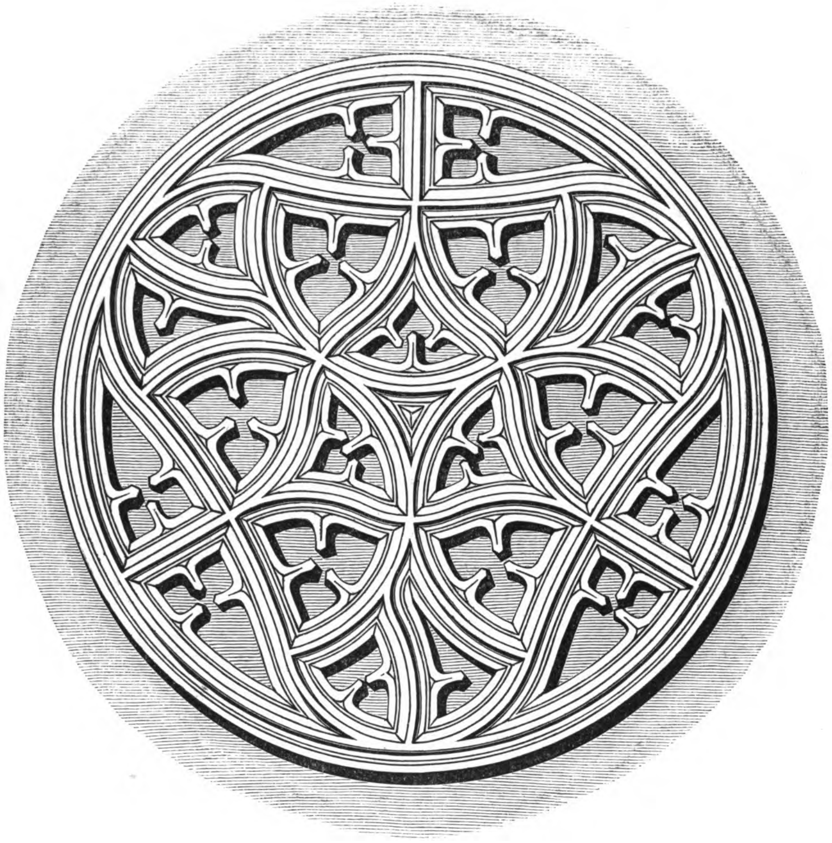


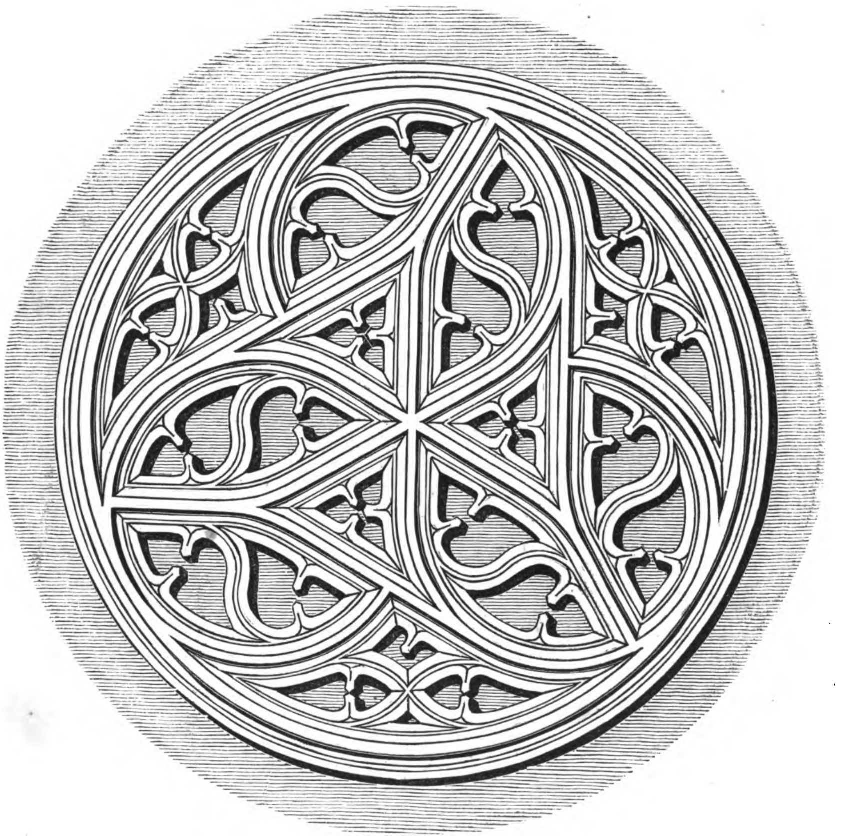
LXI.



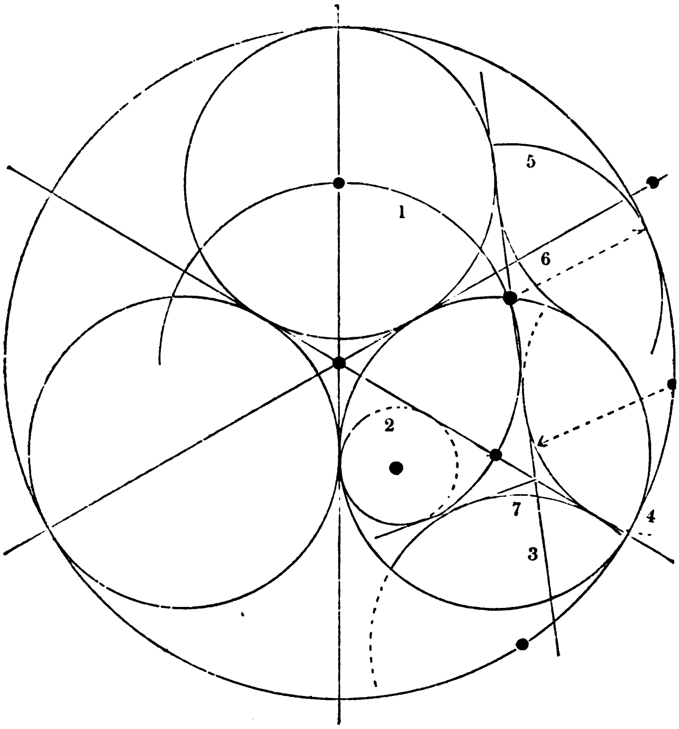
LXII.





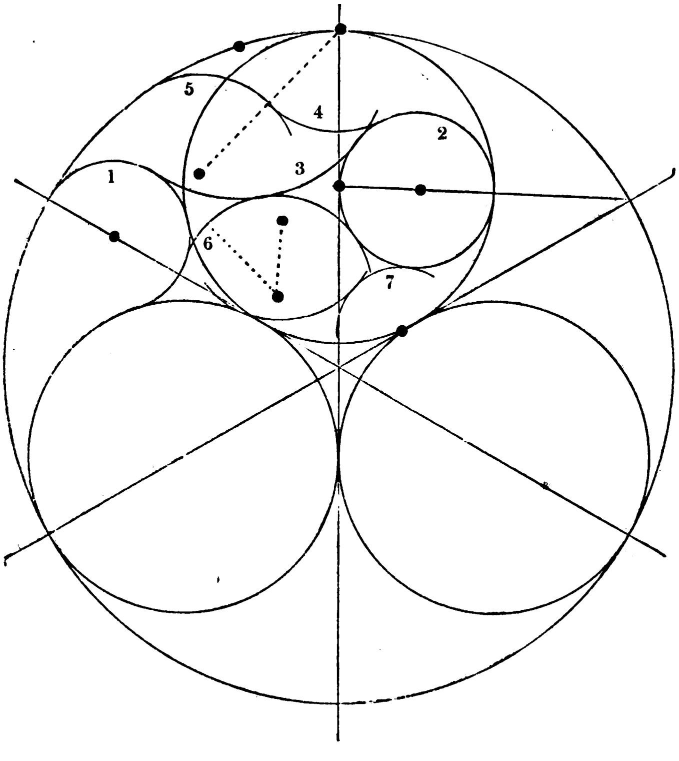


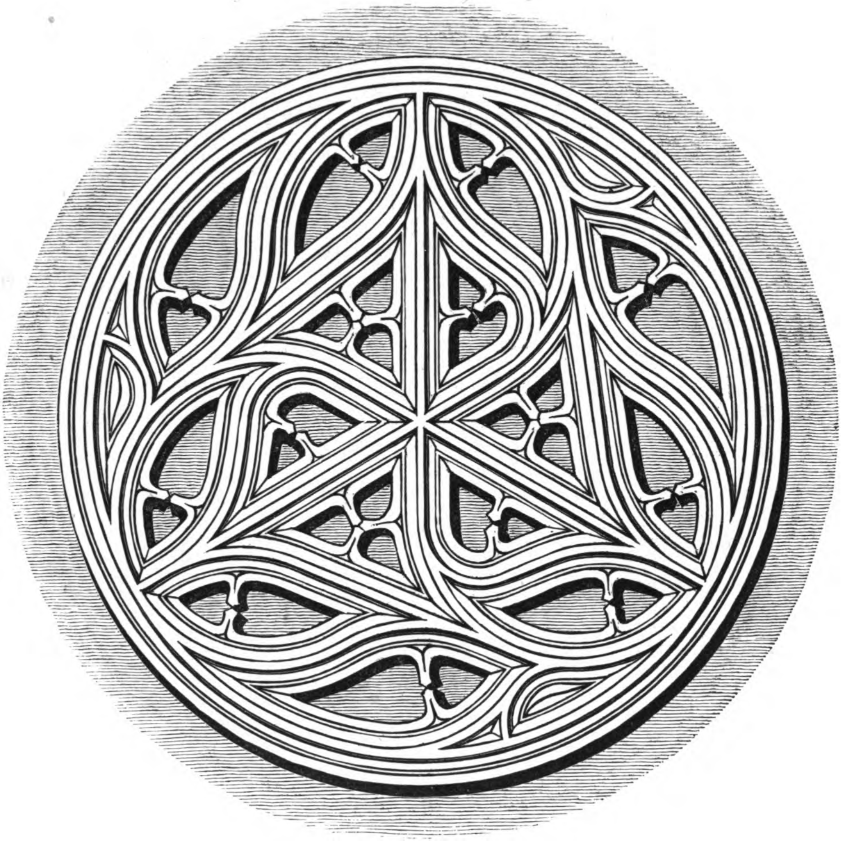
LXIII.

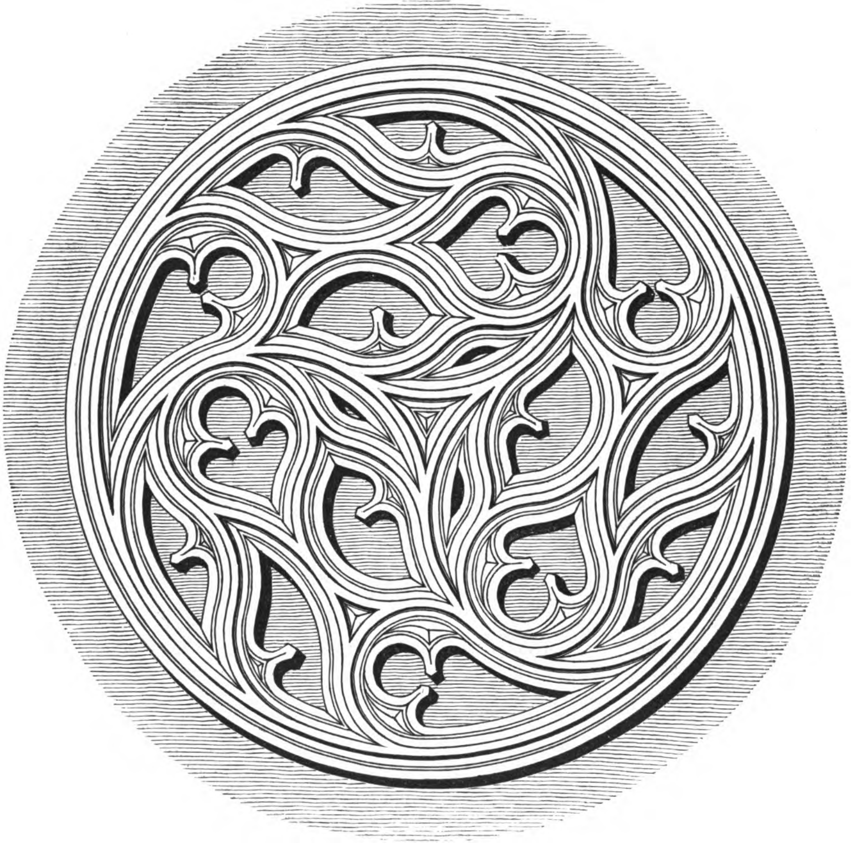


The curves 4, 5, 6, 7, are repetitions of one radius.

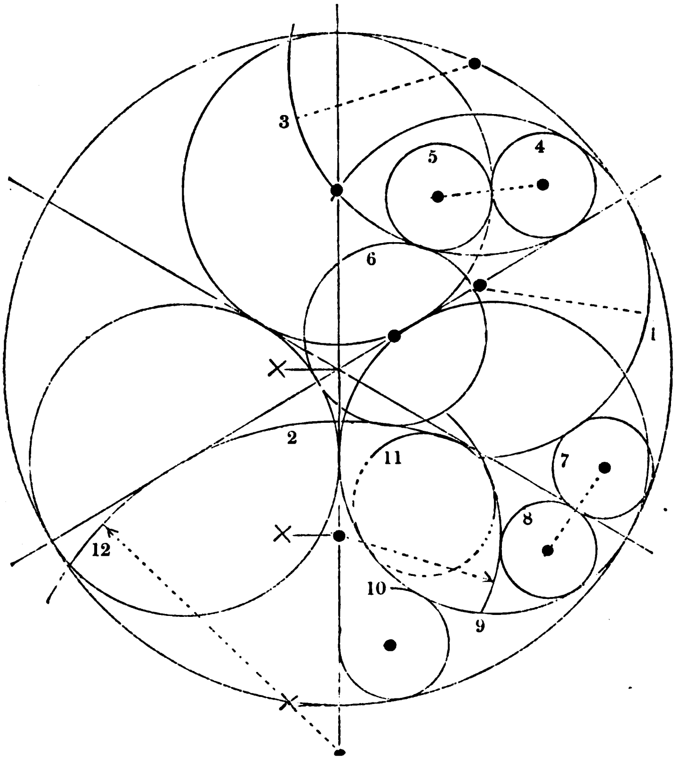
LXIV.



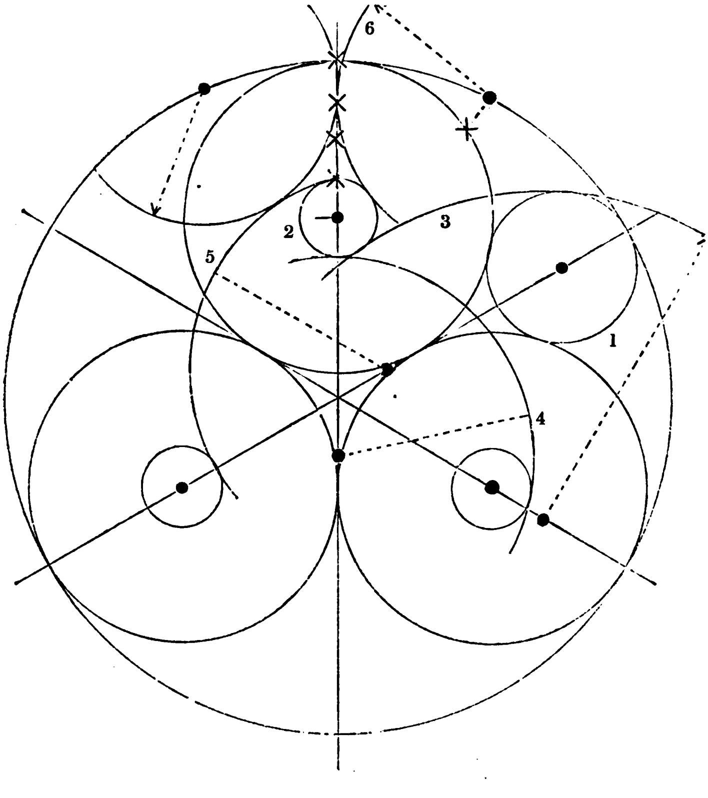


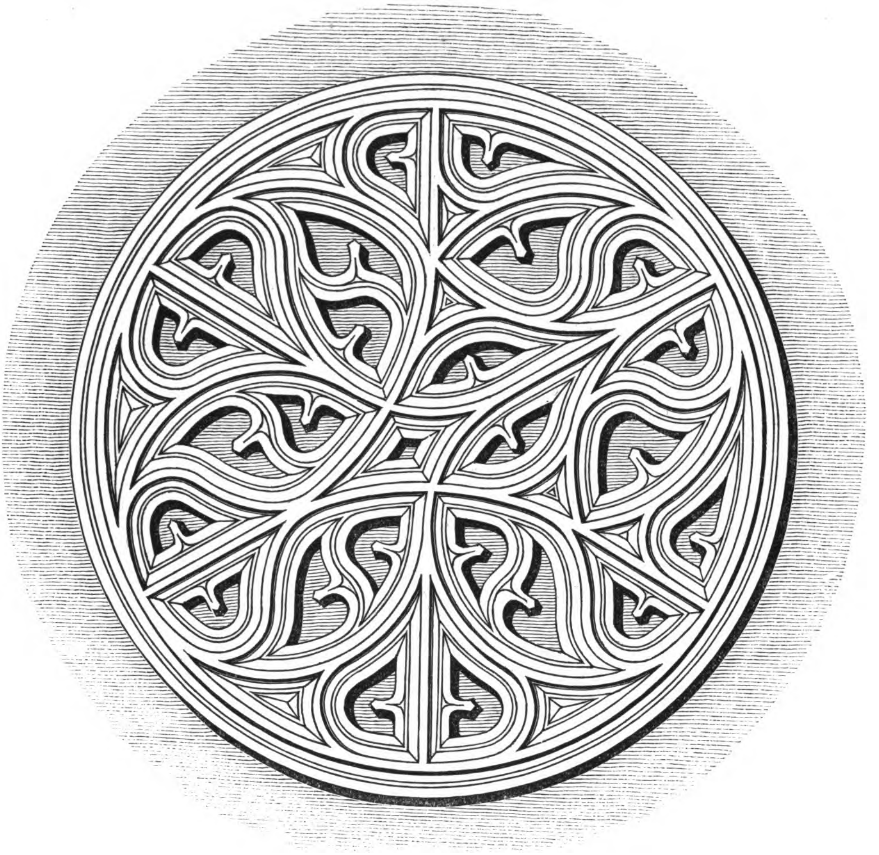


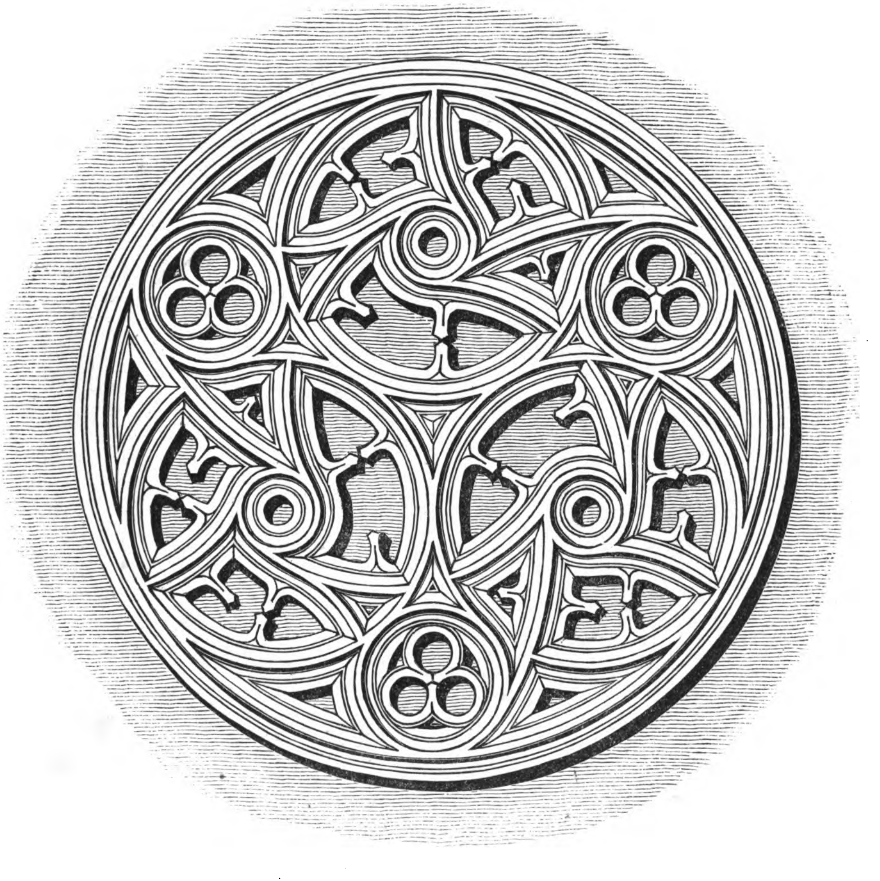
LXV.


3
5
4
6
1
2
11
7
8
12
10
9

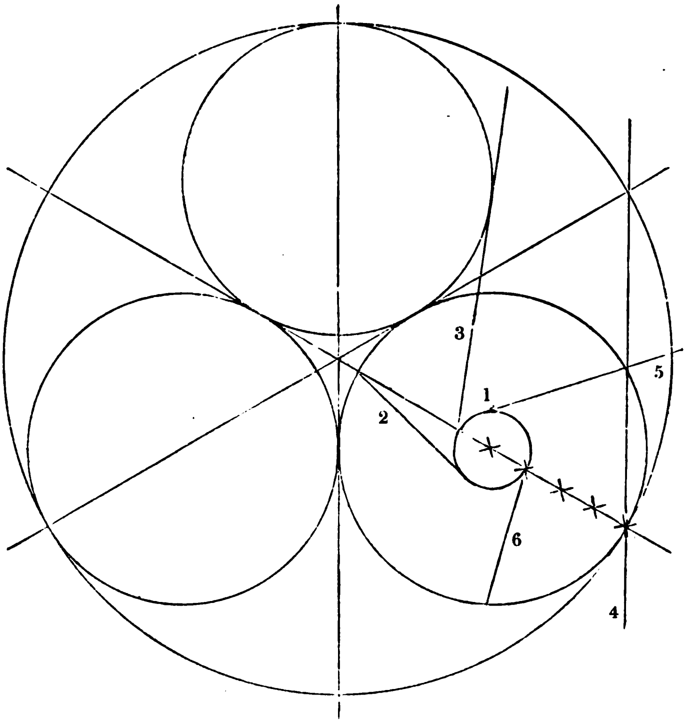
LXVI.



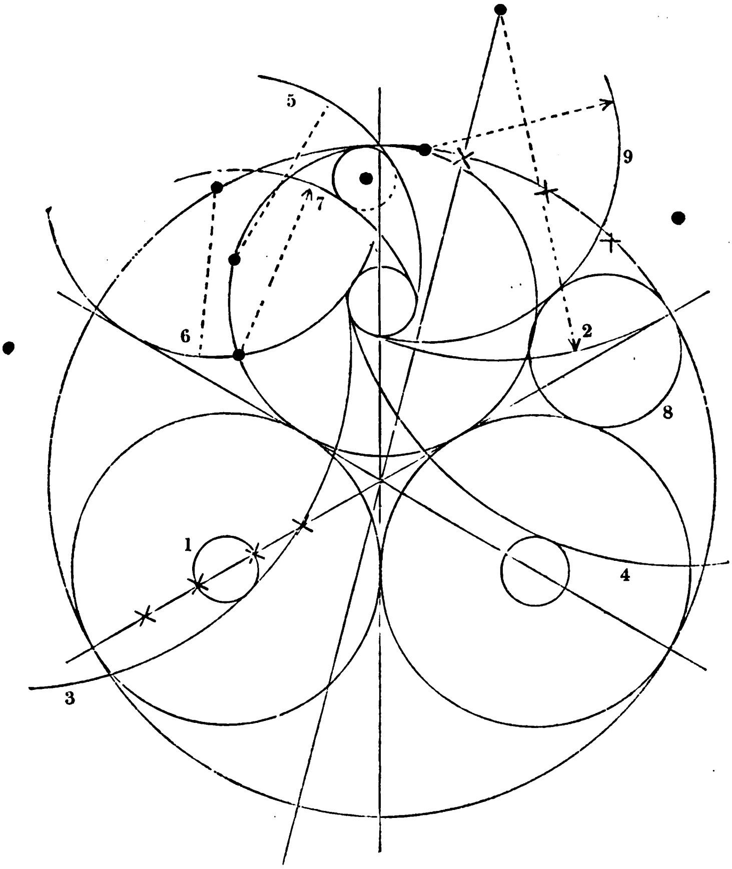




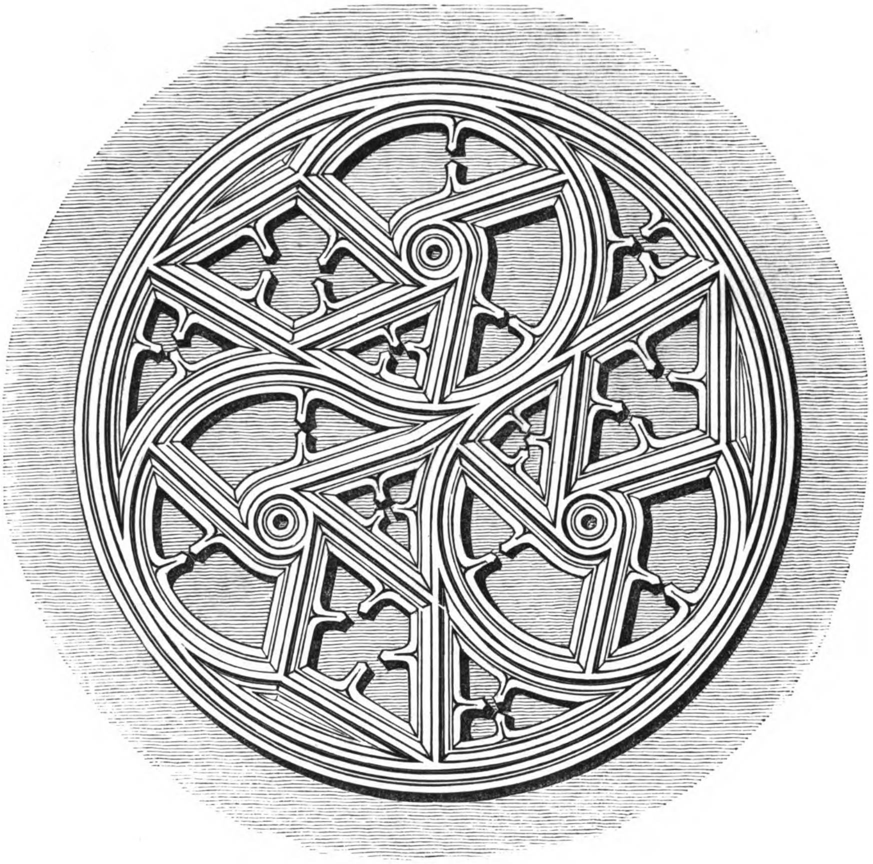
LXVII.

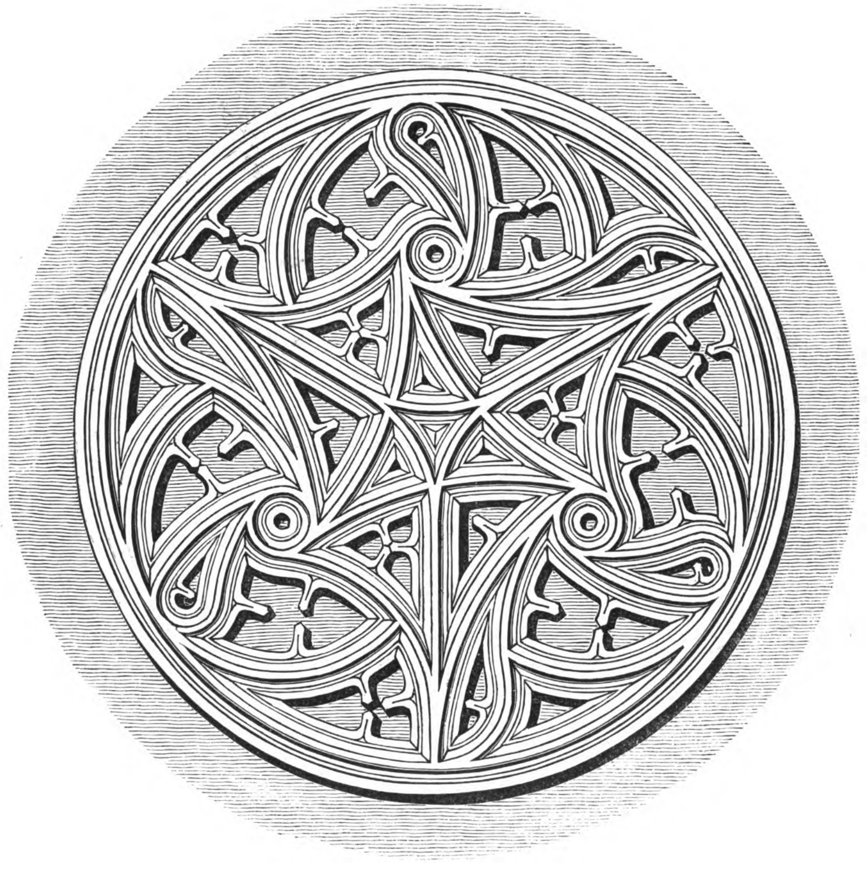


LXVIII.

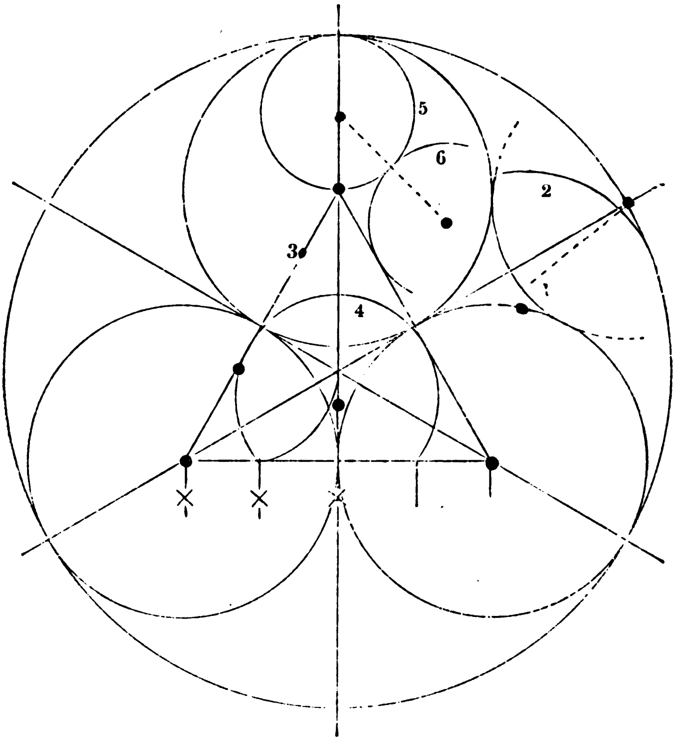


The curves 2, 3, 4, are repetitions.

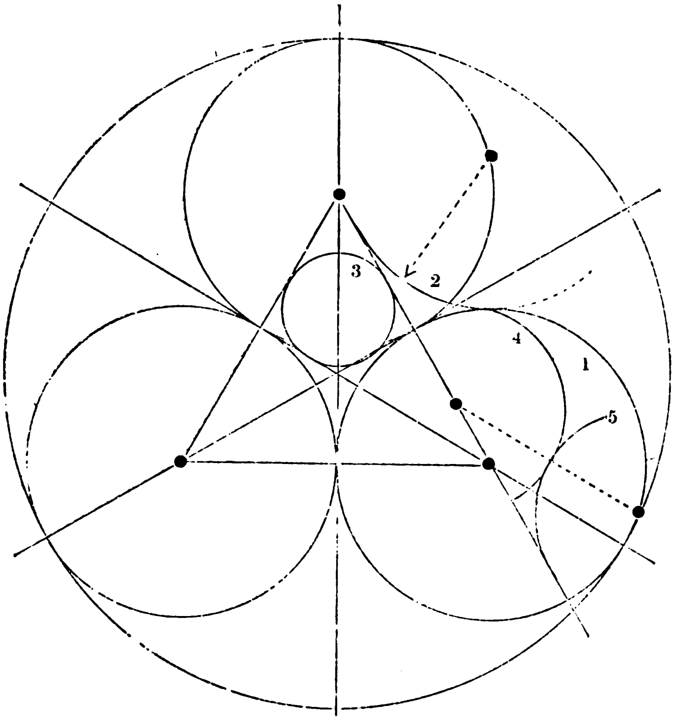




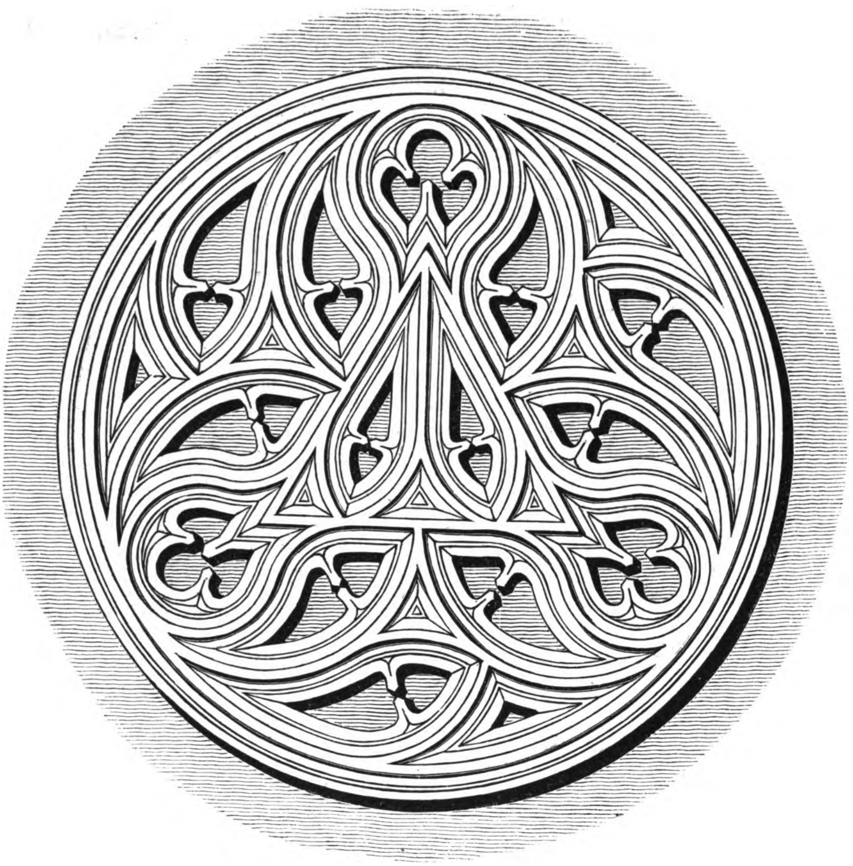
LXIX.

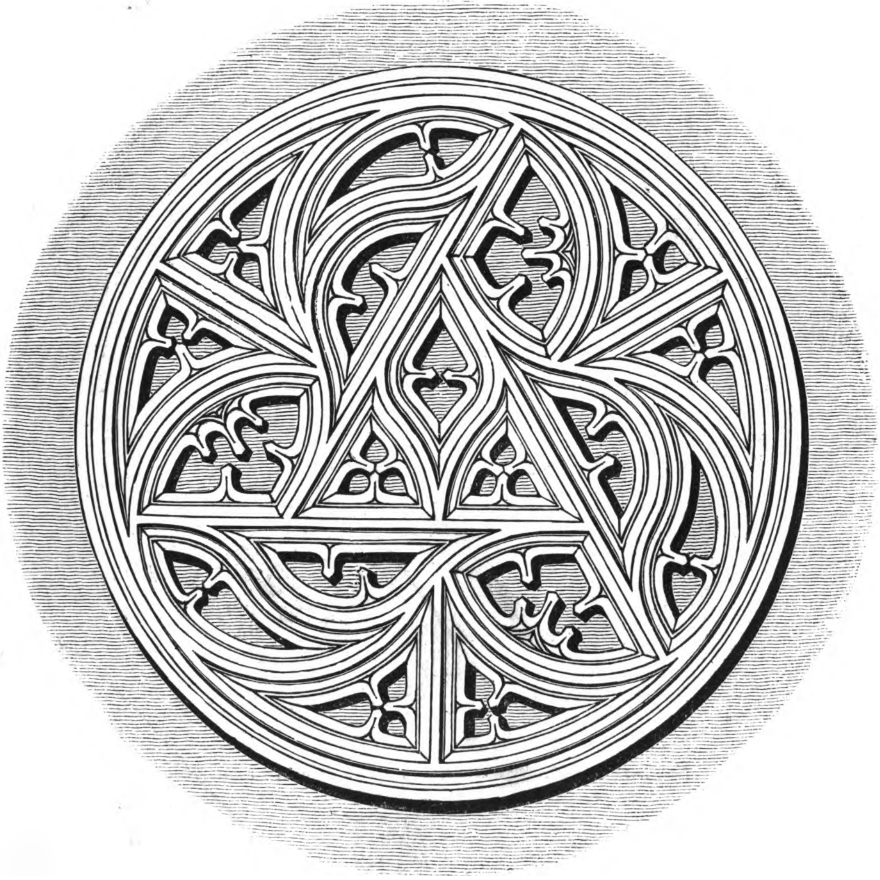


LXX.

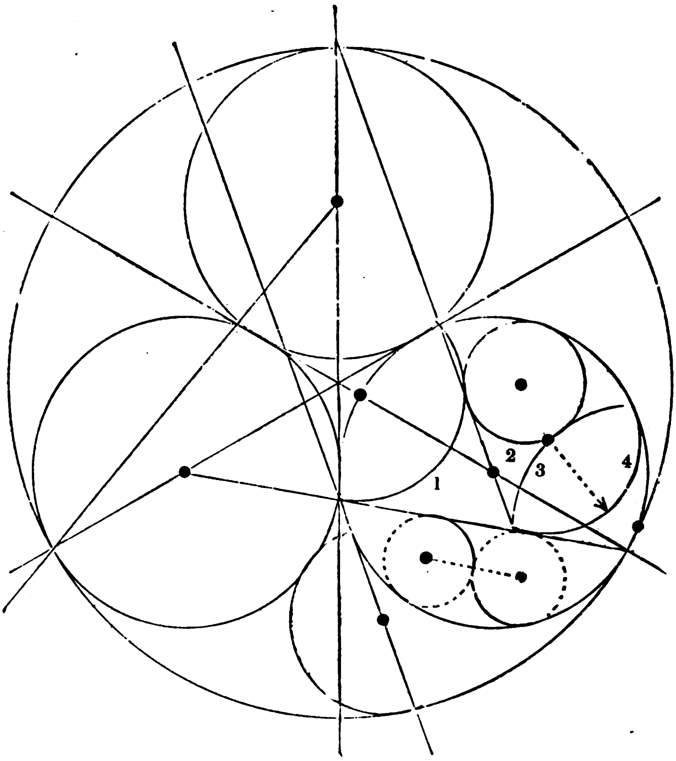


Here numbers 1 and 2 are of the same radius.

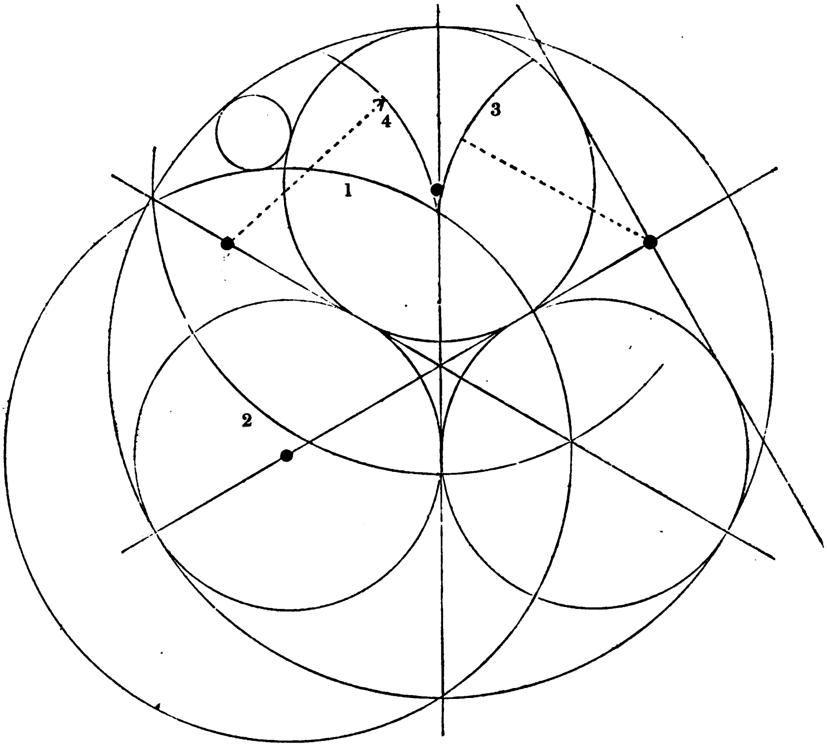




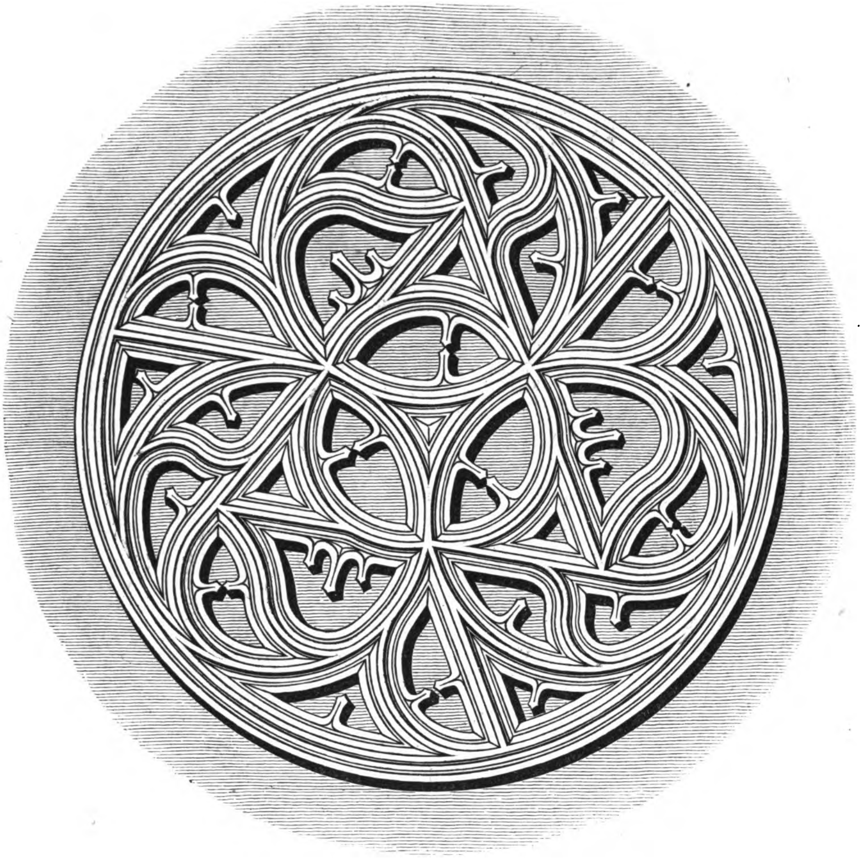
LXXI.

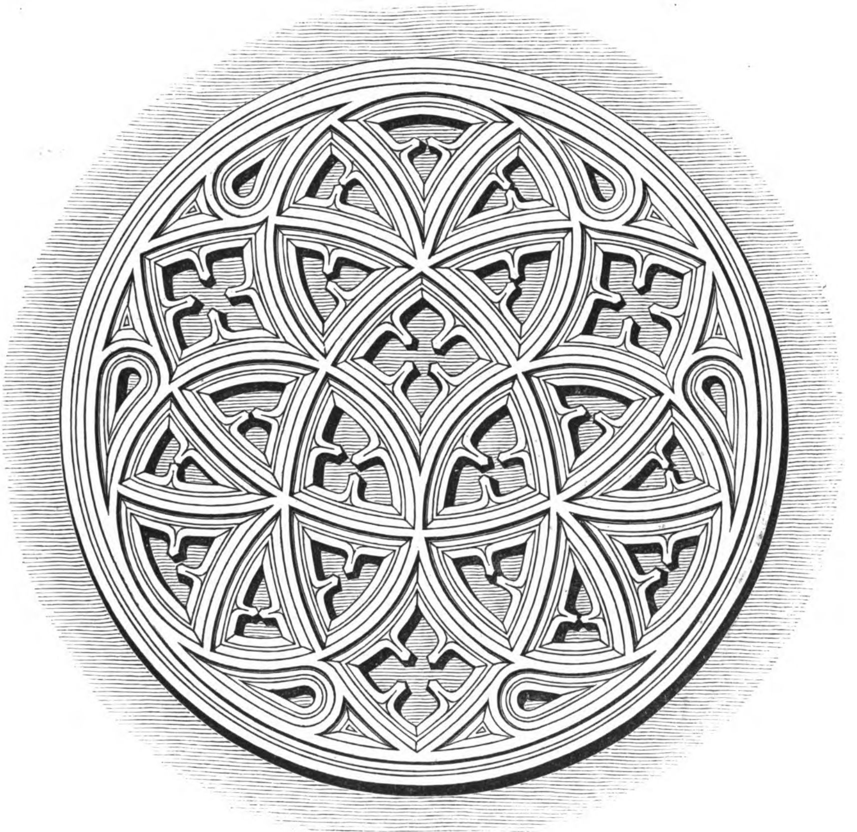


LXXII.

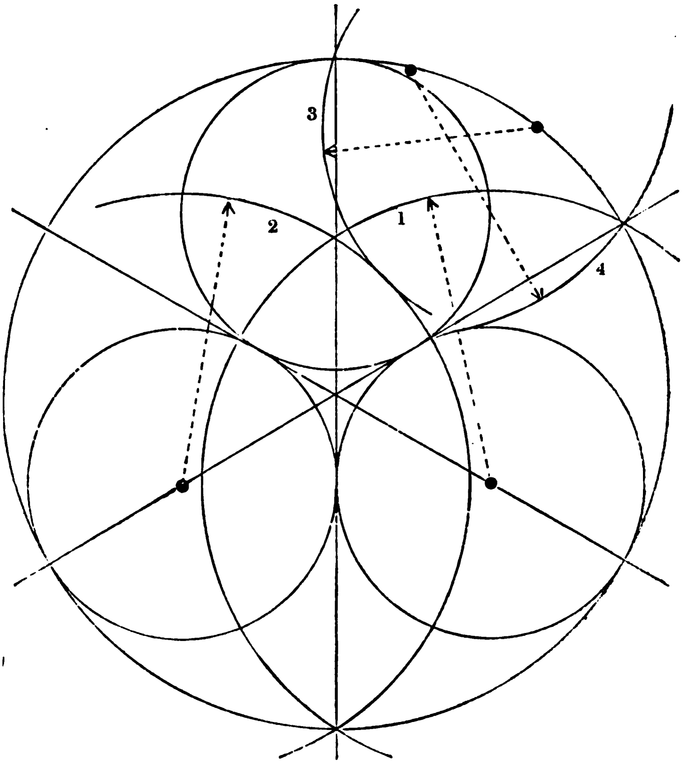


Numbers 1 and 2 are similar, and so are numbers 3 and 4.

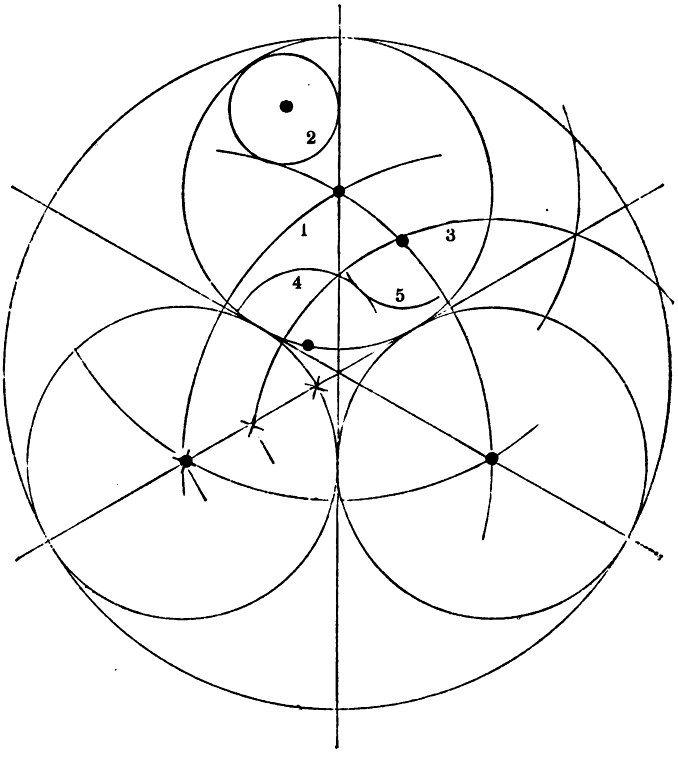


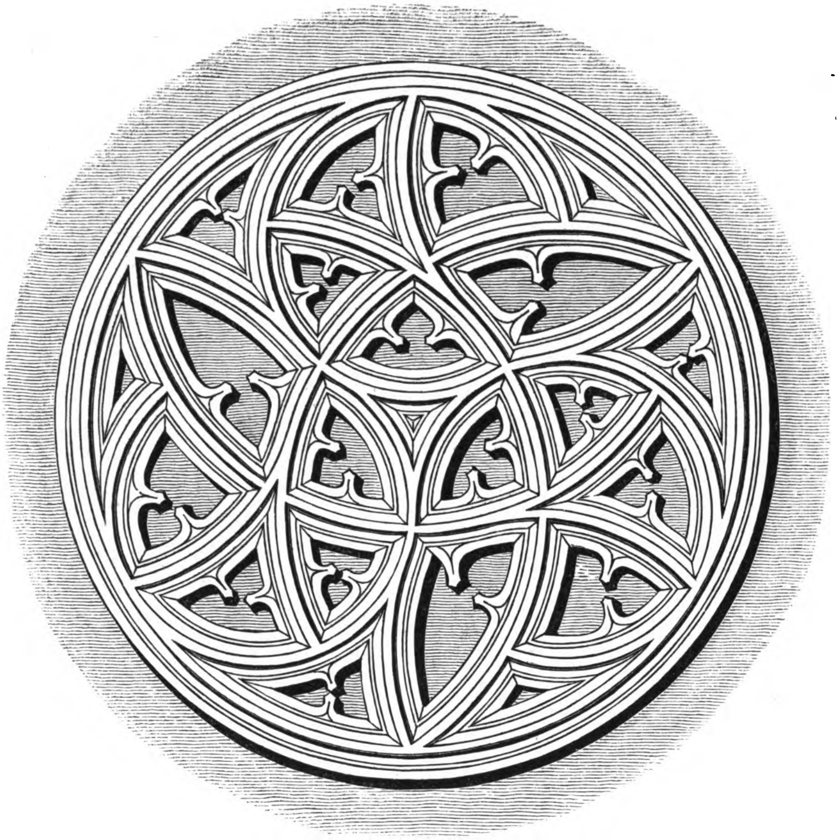


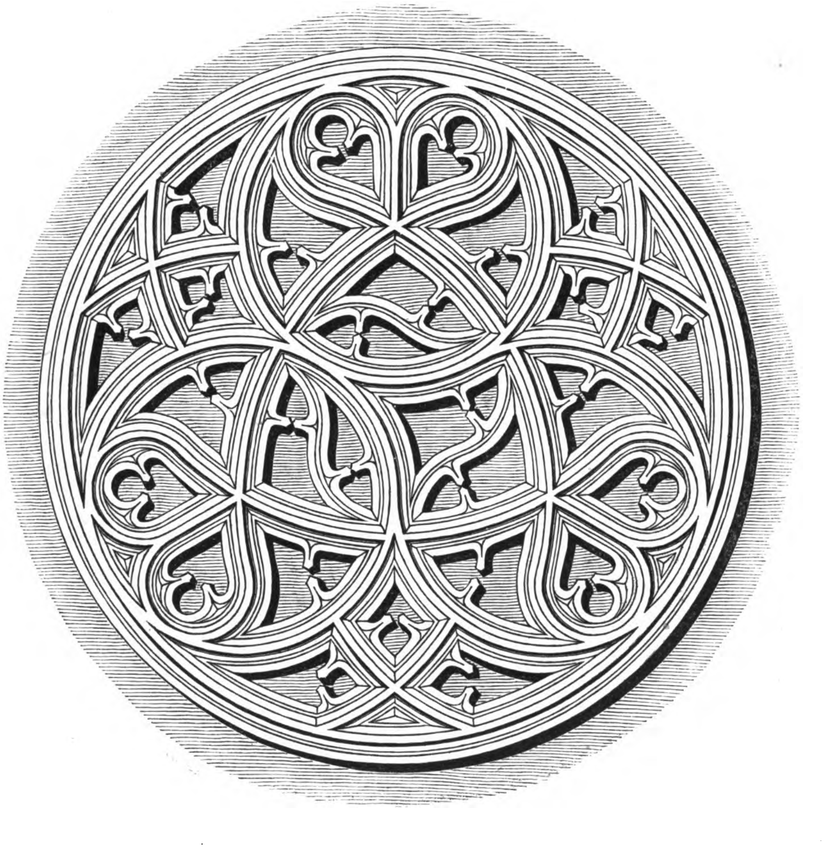
LXXIII.



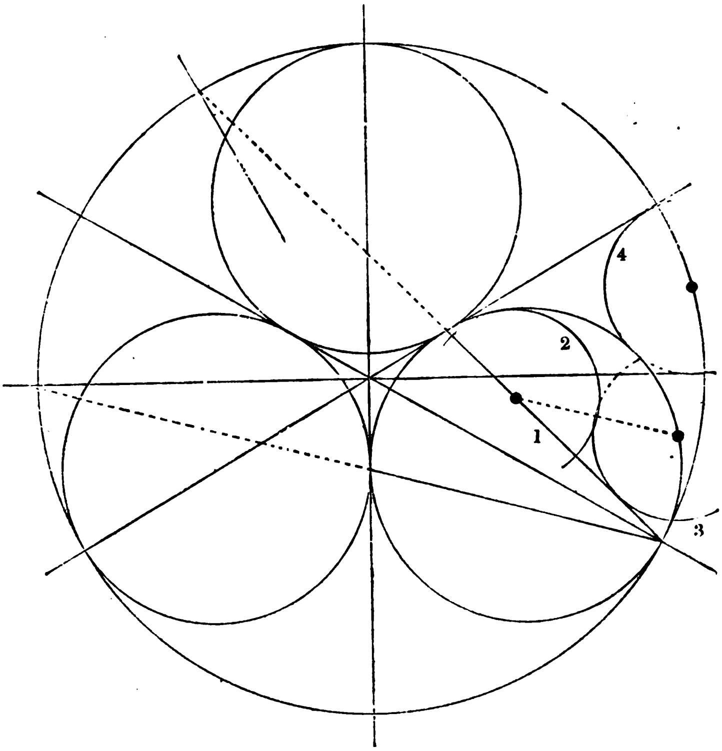
LXXIV.



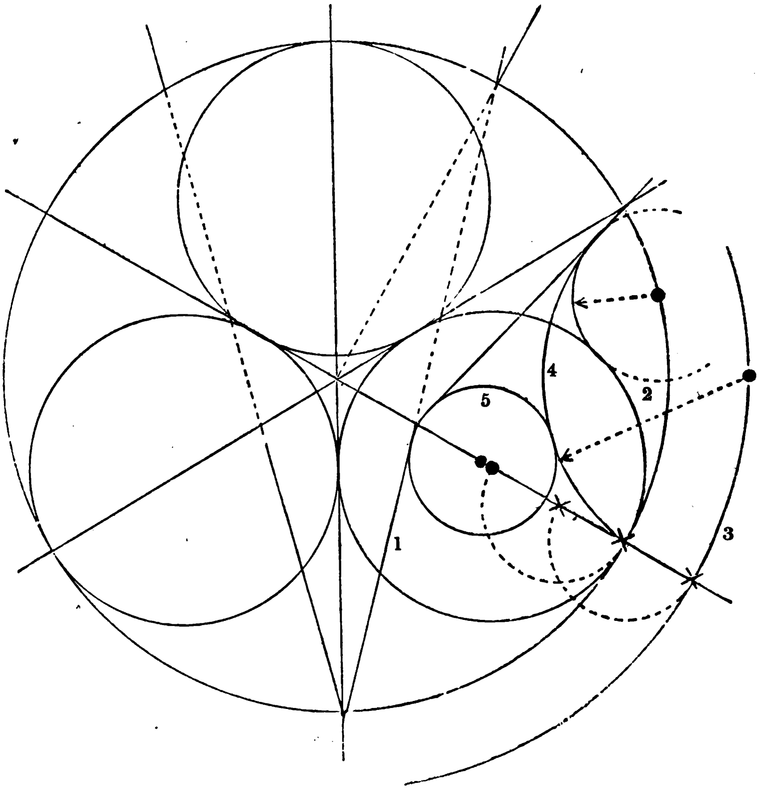


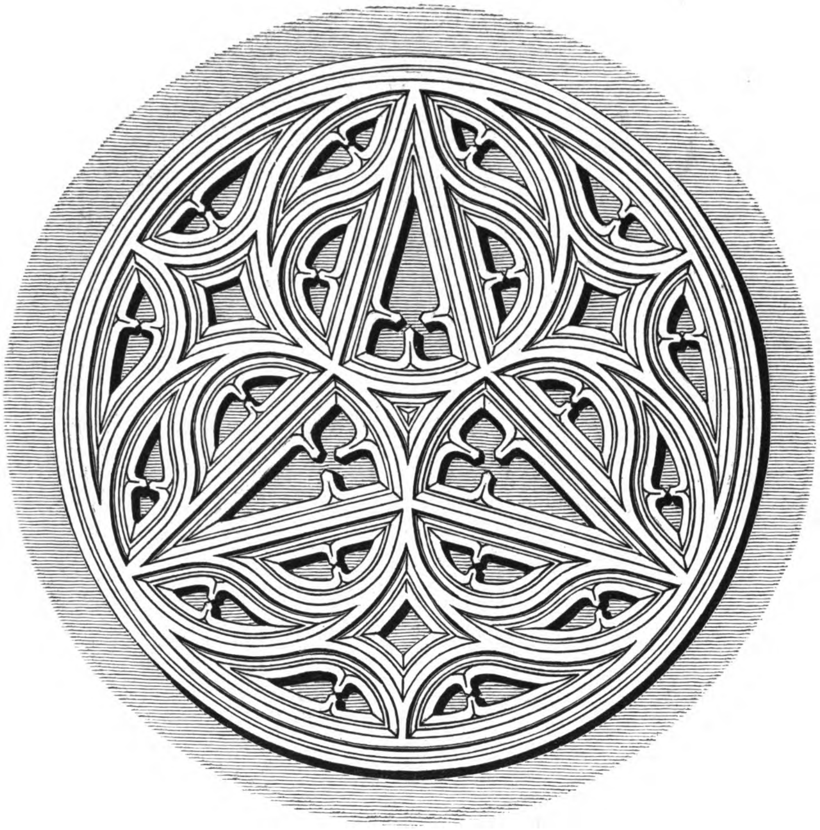


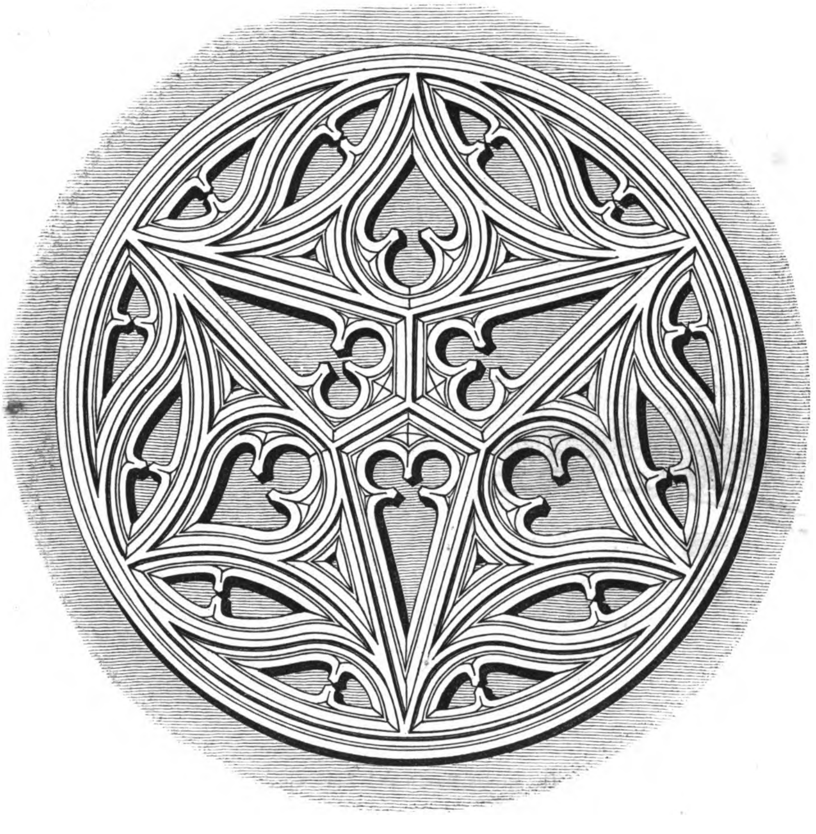
LXXV.



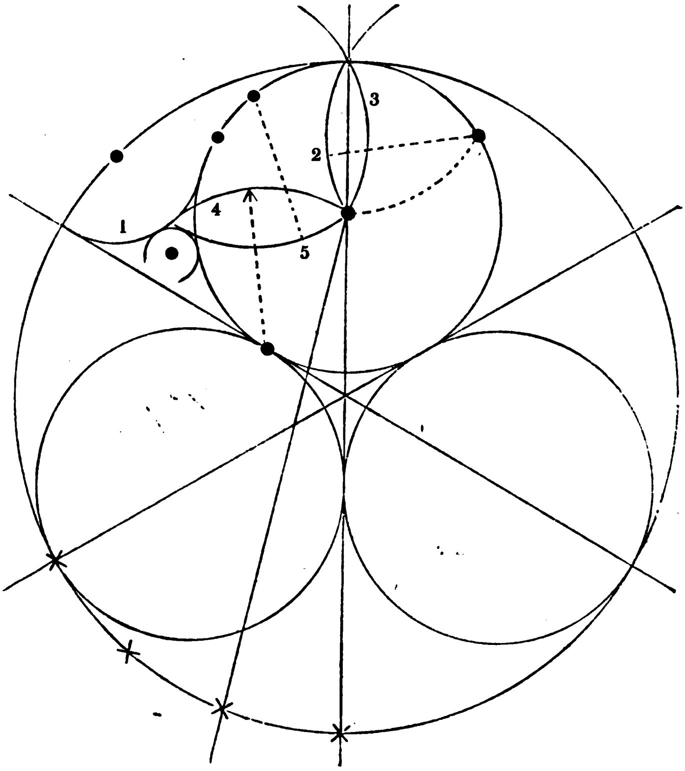
LXXVI.



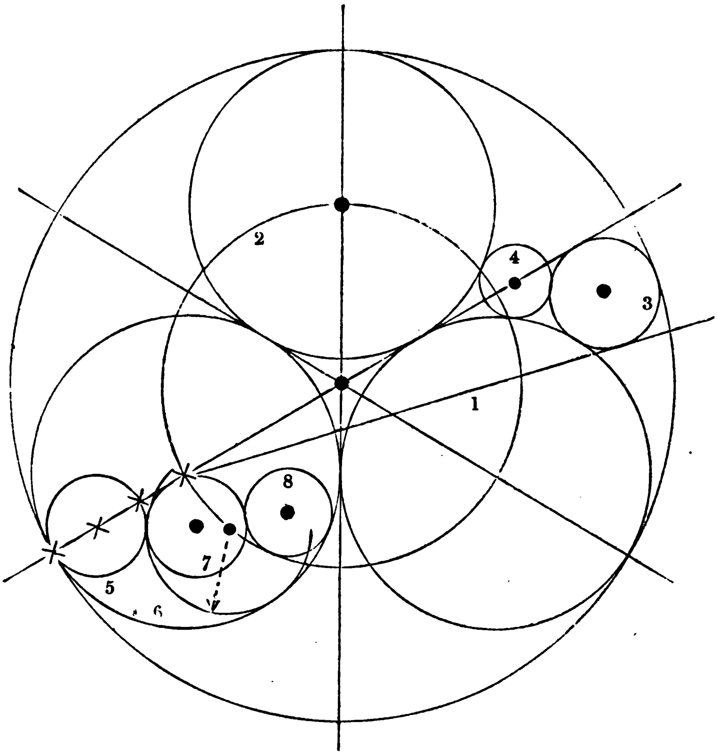




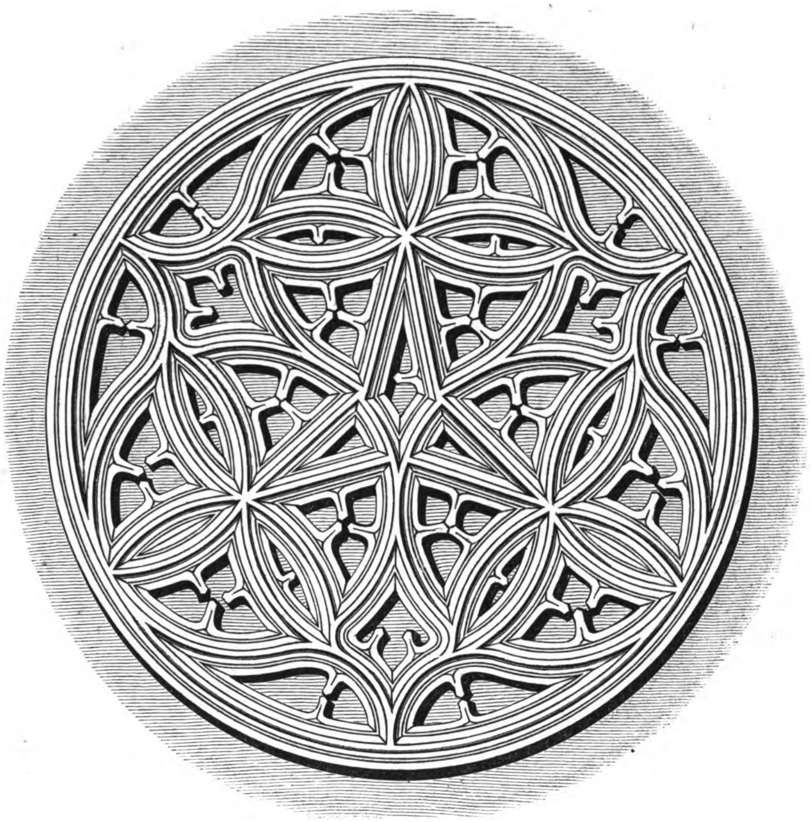
LXXVII.

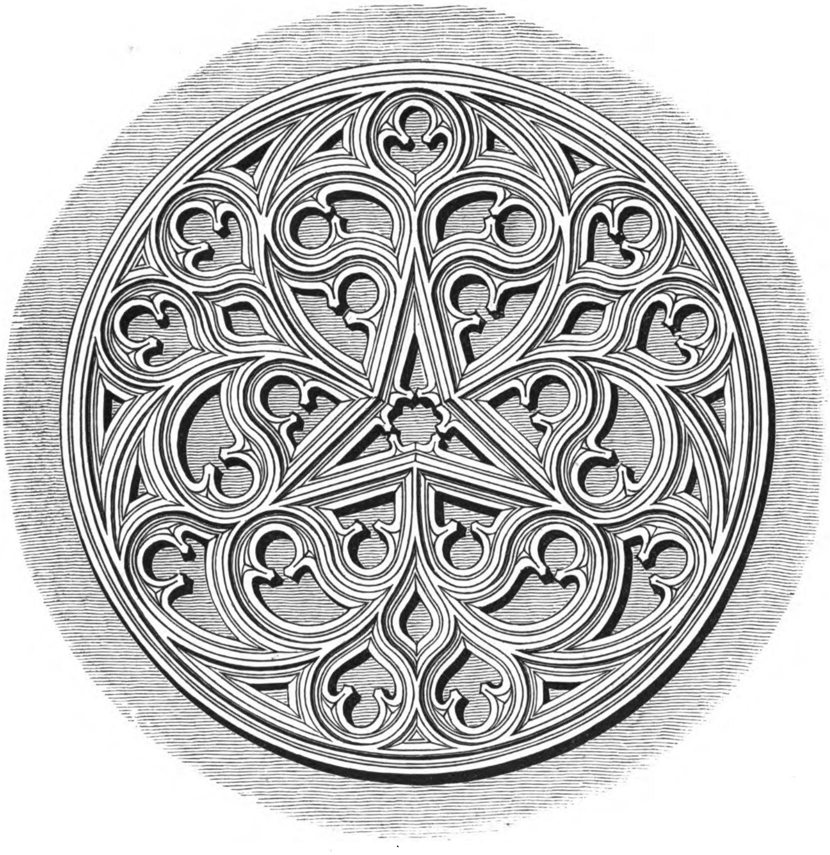


LXXVIII.

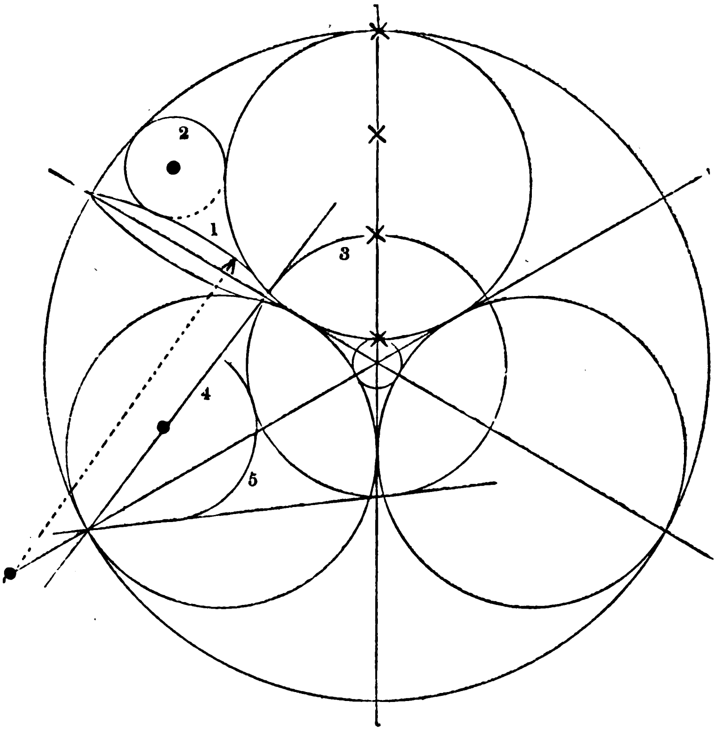


The circles Nos. 5 and 7 are equal.

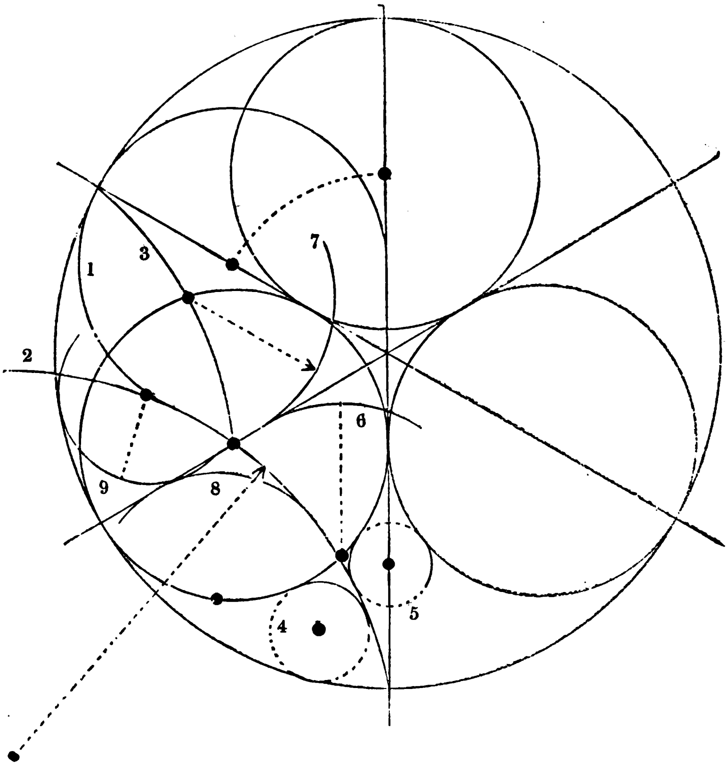




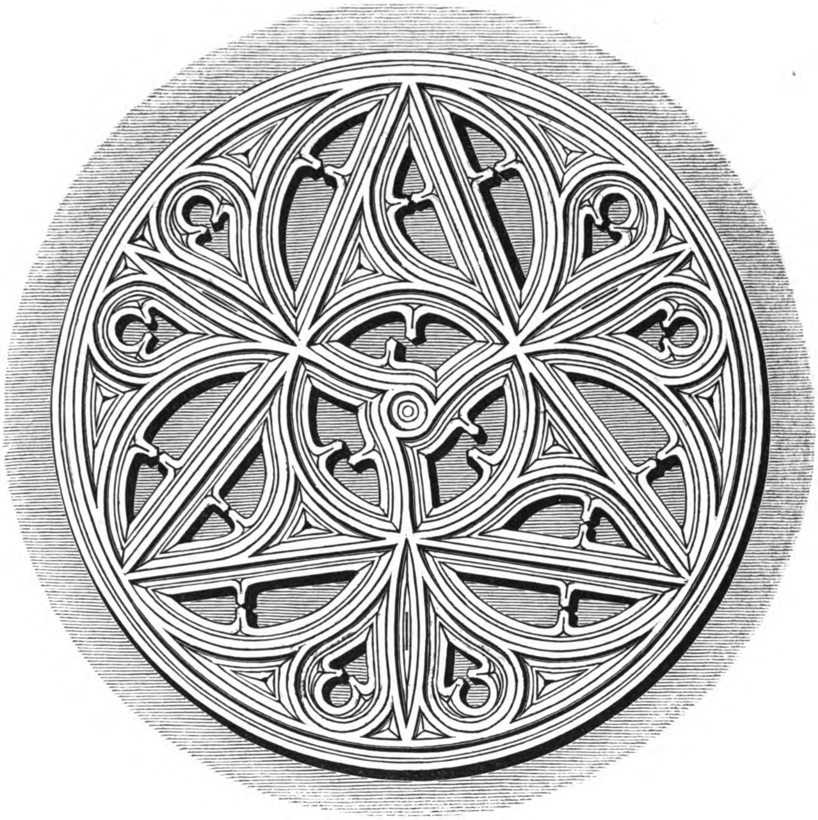
LXXIX.

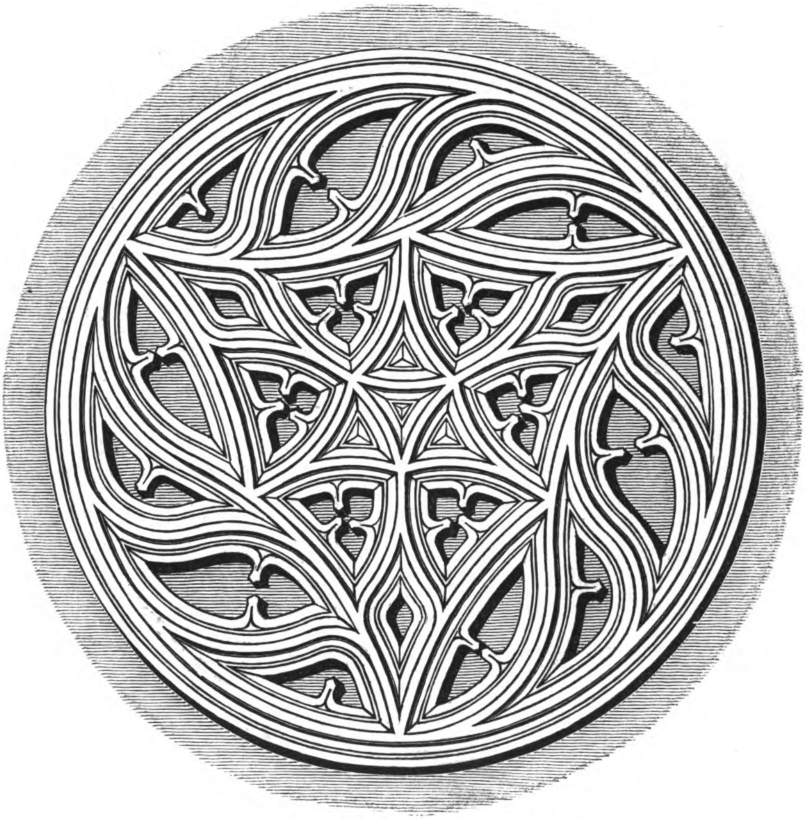


LXXX.

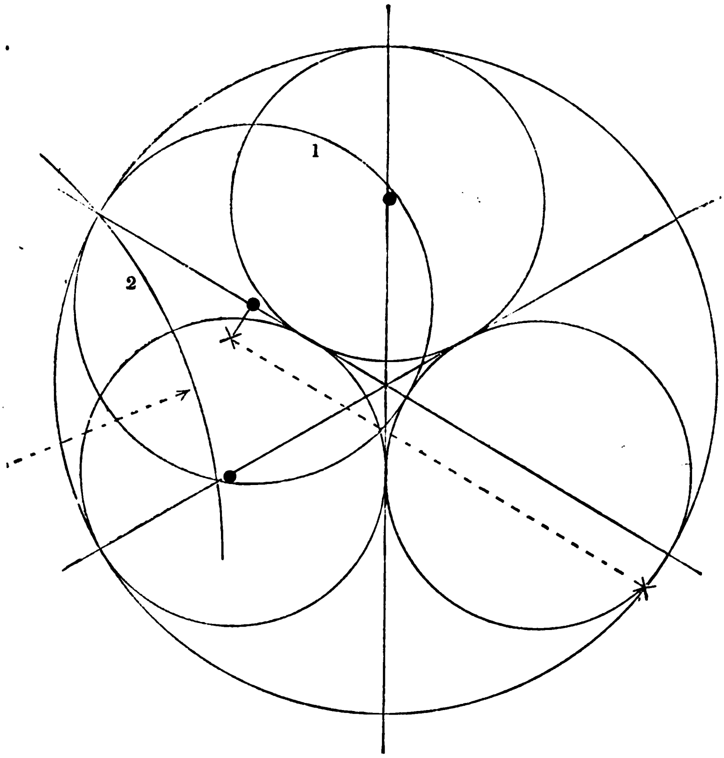


The curves 2 and 3 are repetitions.

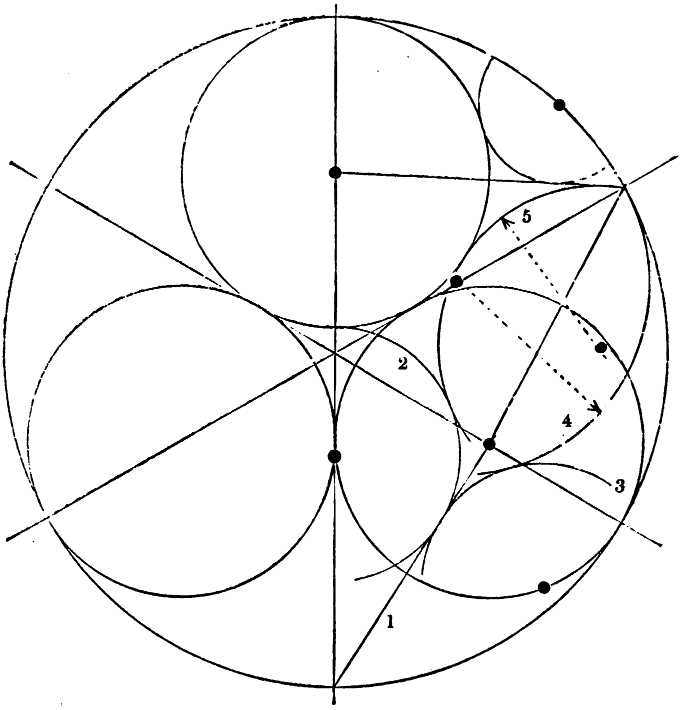


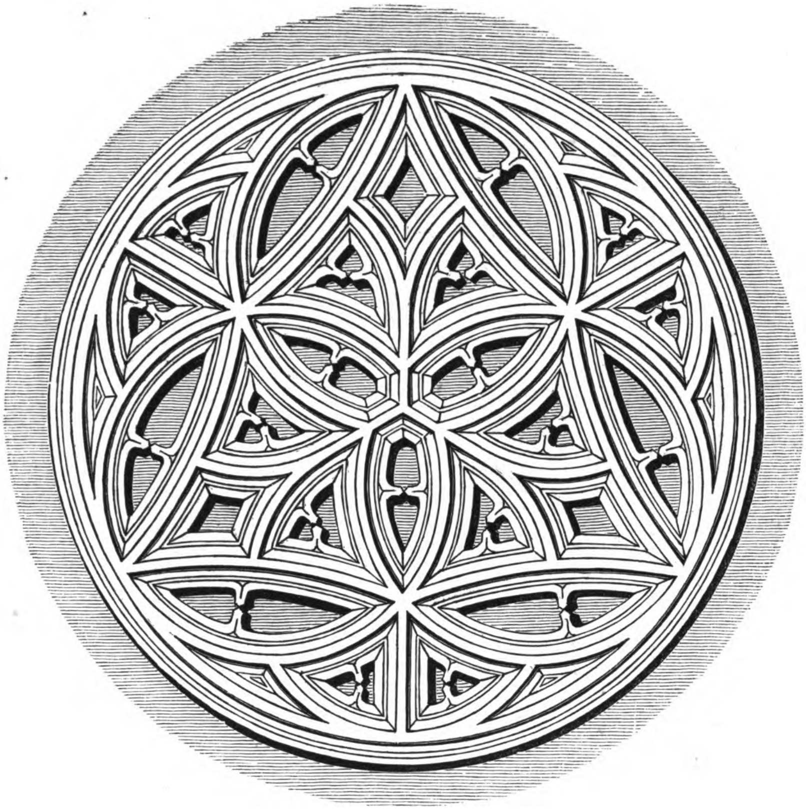


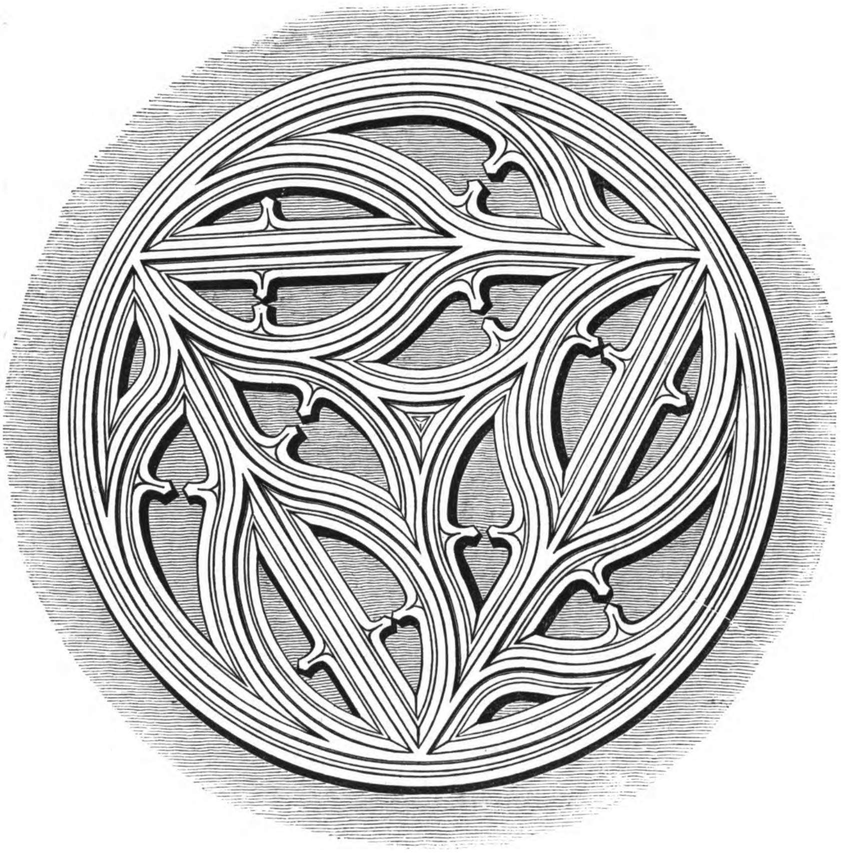
LXXXI.



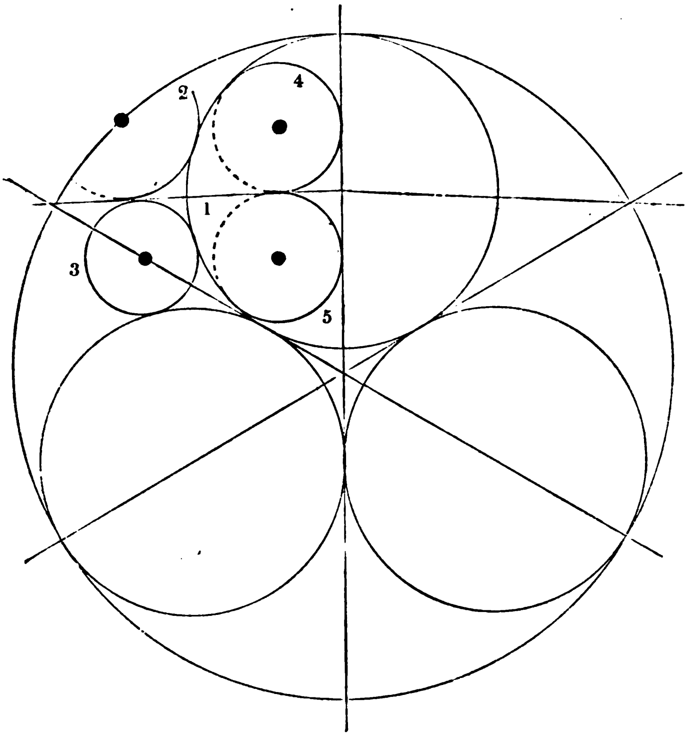
LXXXII.



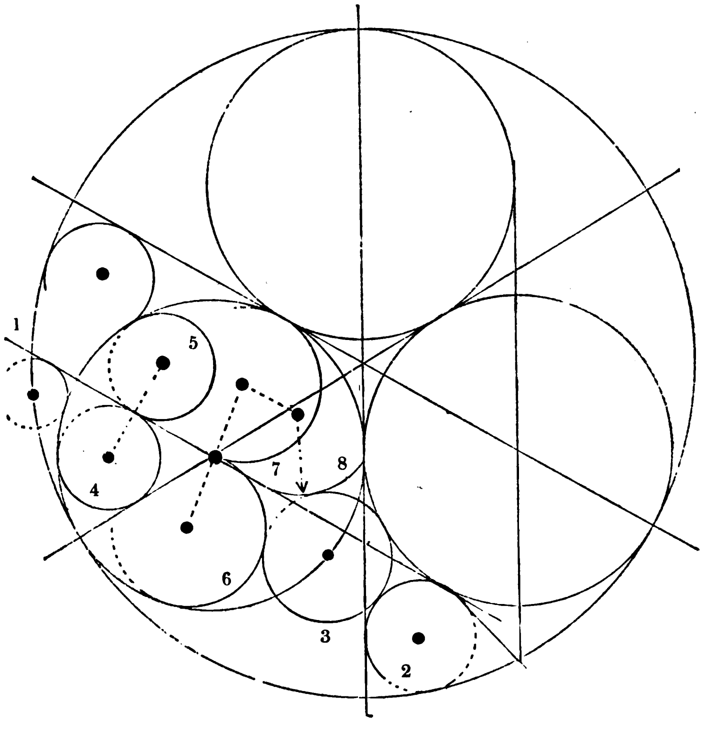




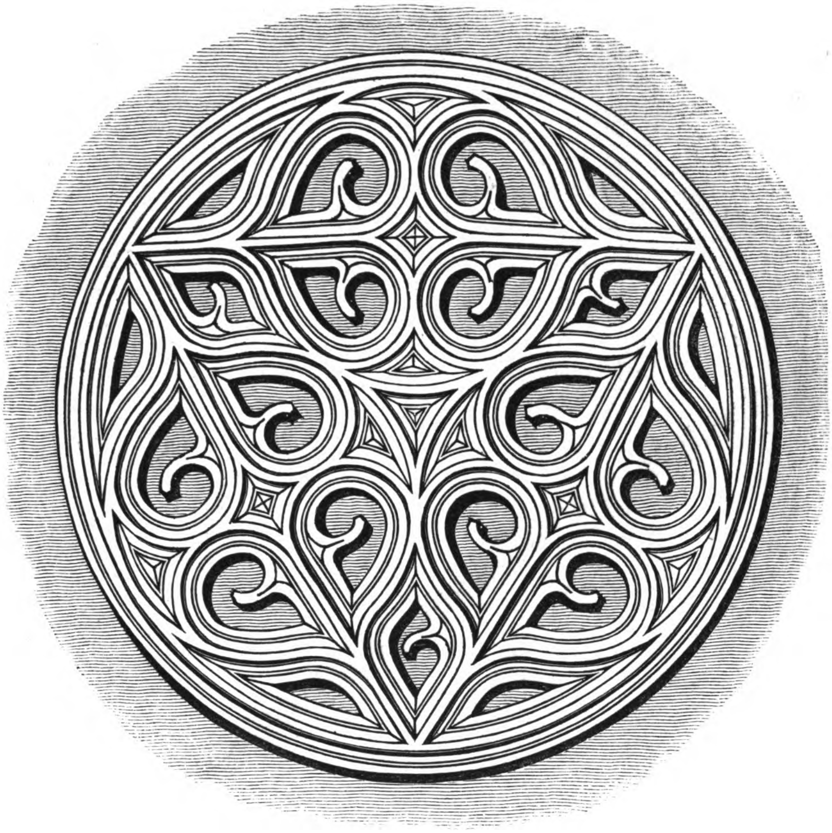
LXXXIII.

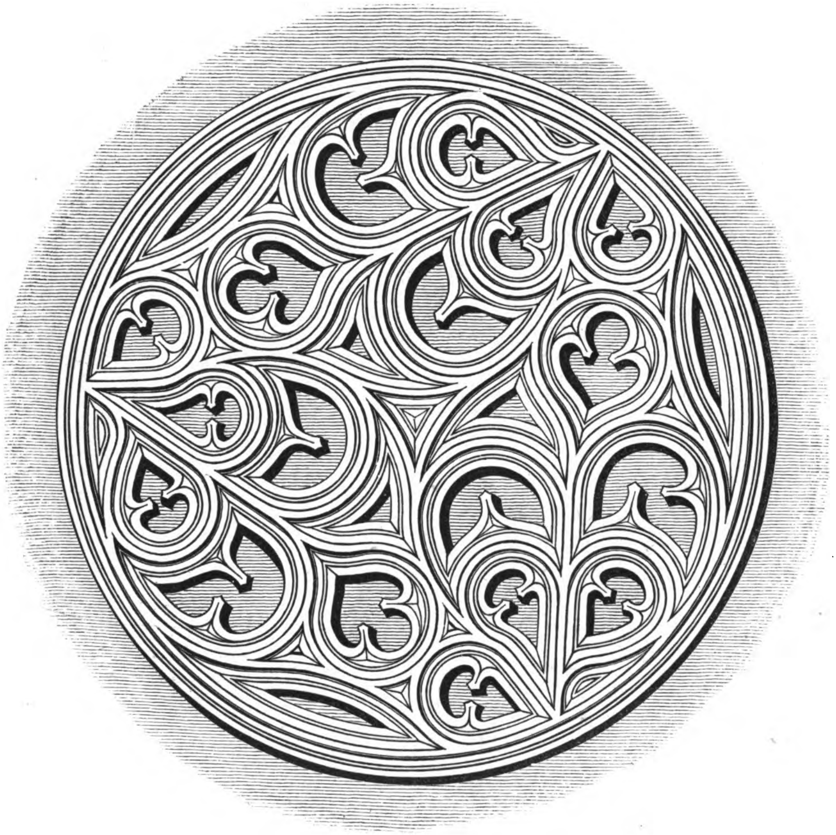


LXXXIV.

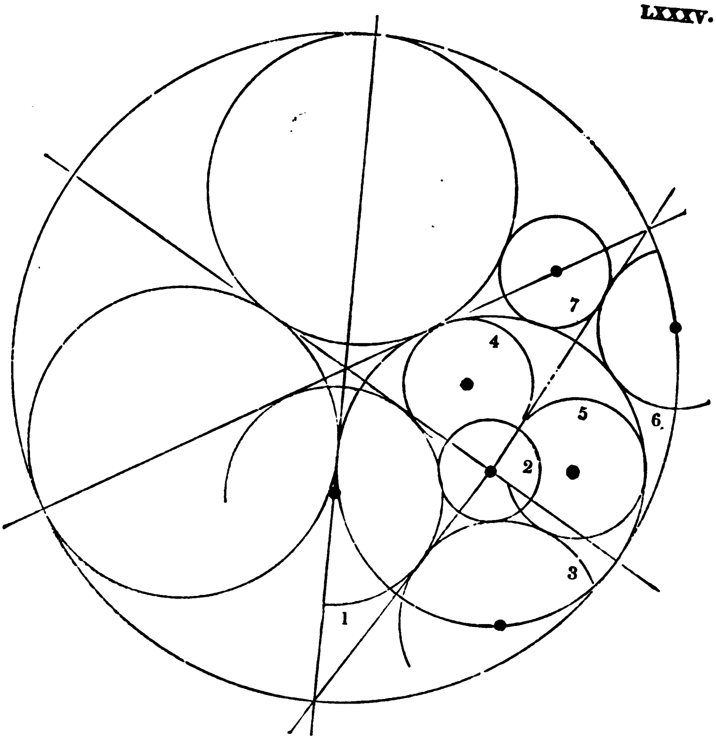


Numbers 6, 7, 8, are similar curves.

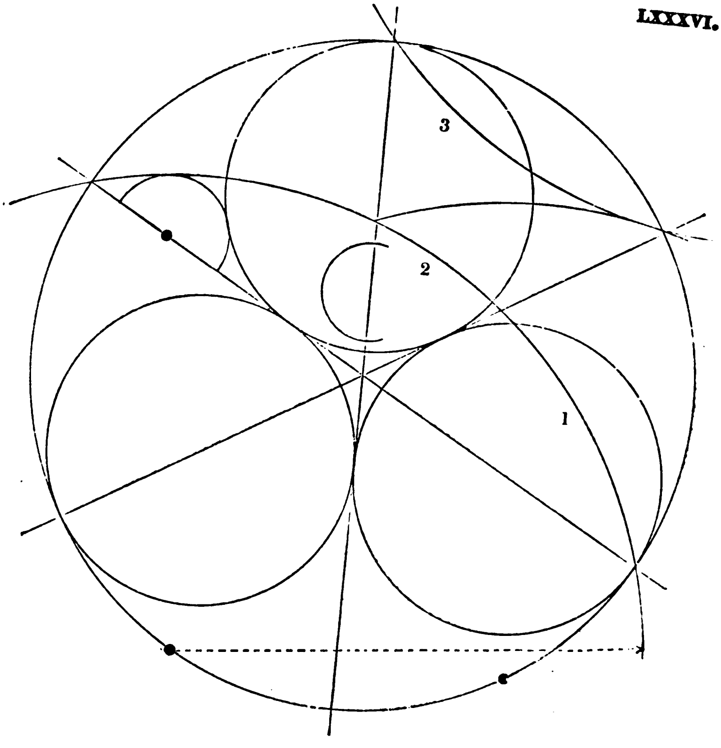


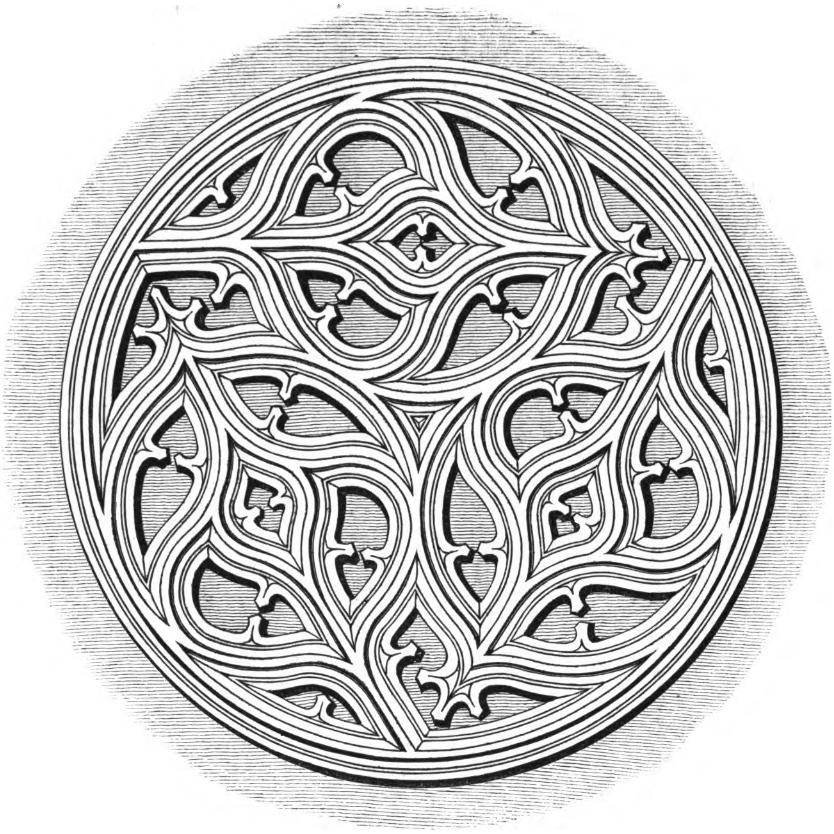


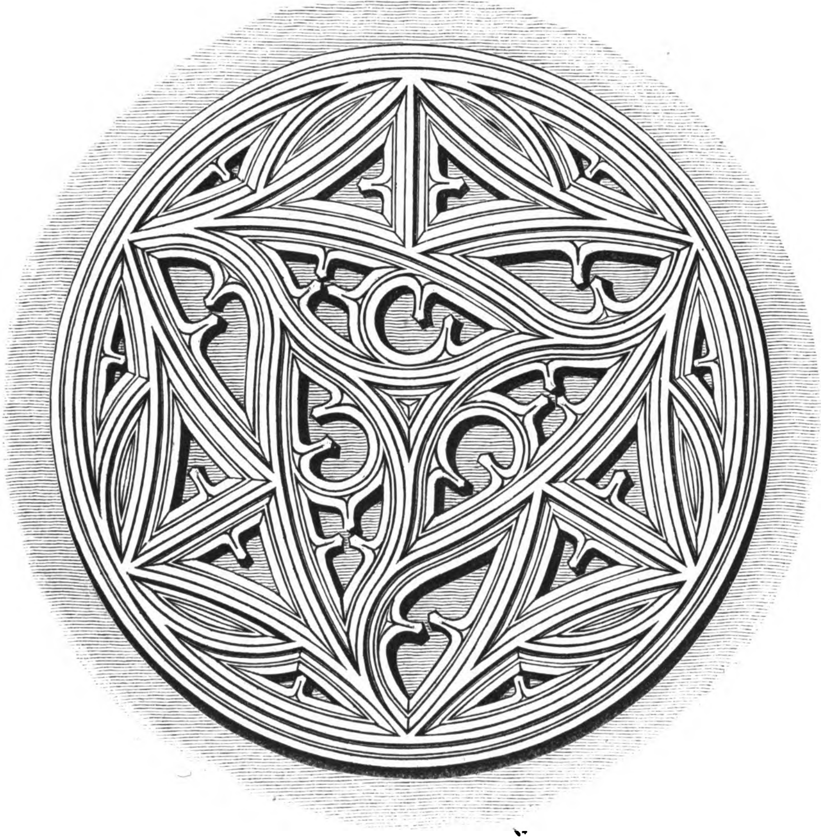
LXXXV.



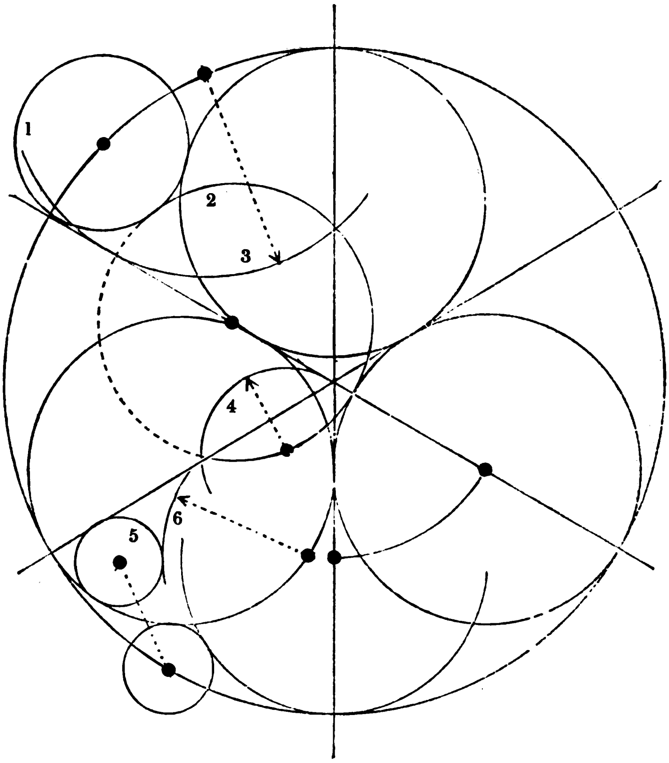
LXXXVI.



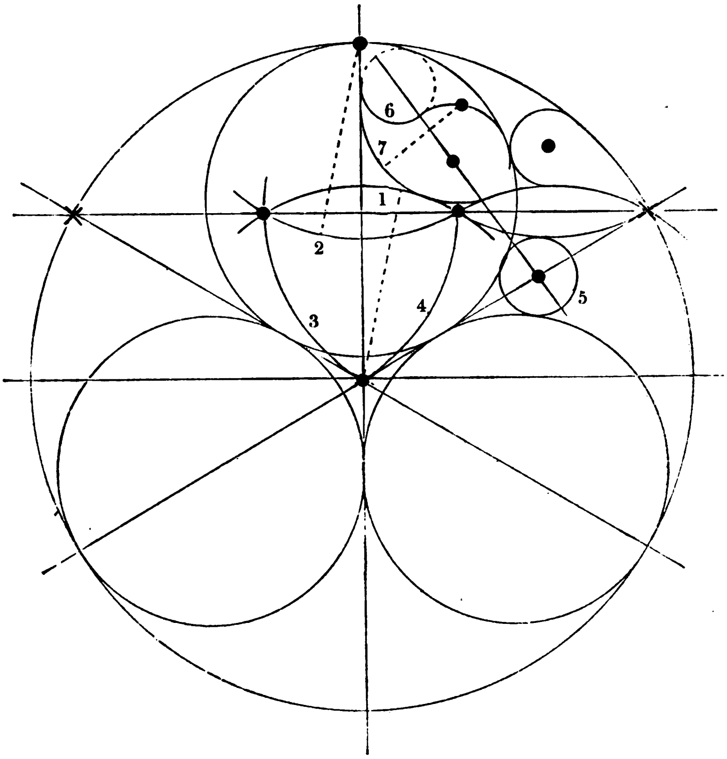




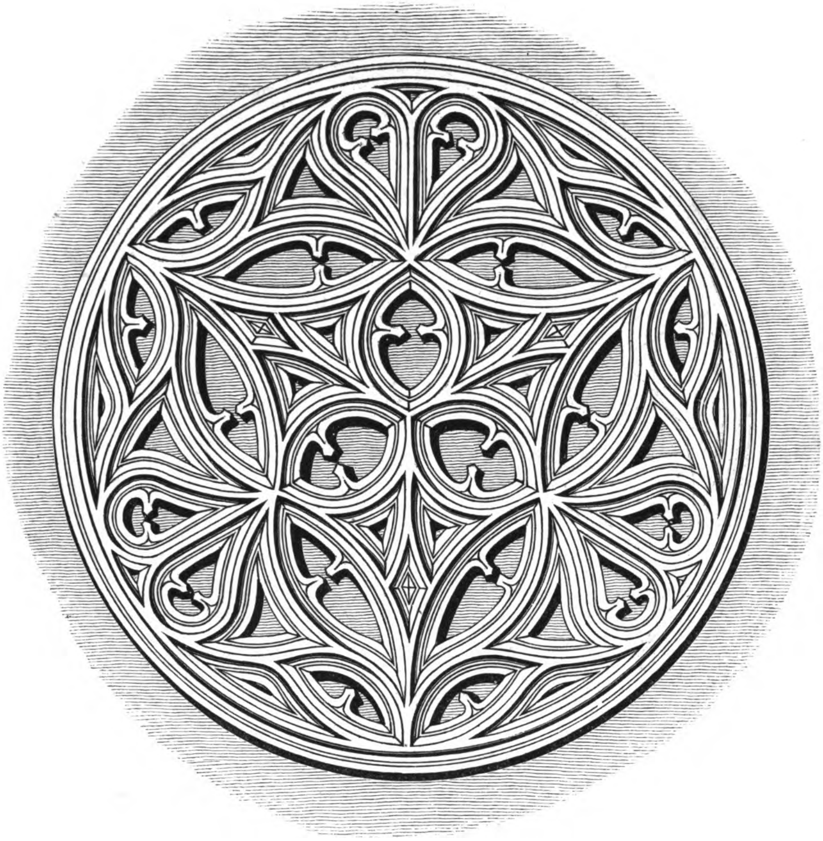
LXXXVII.

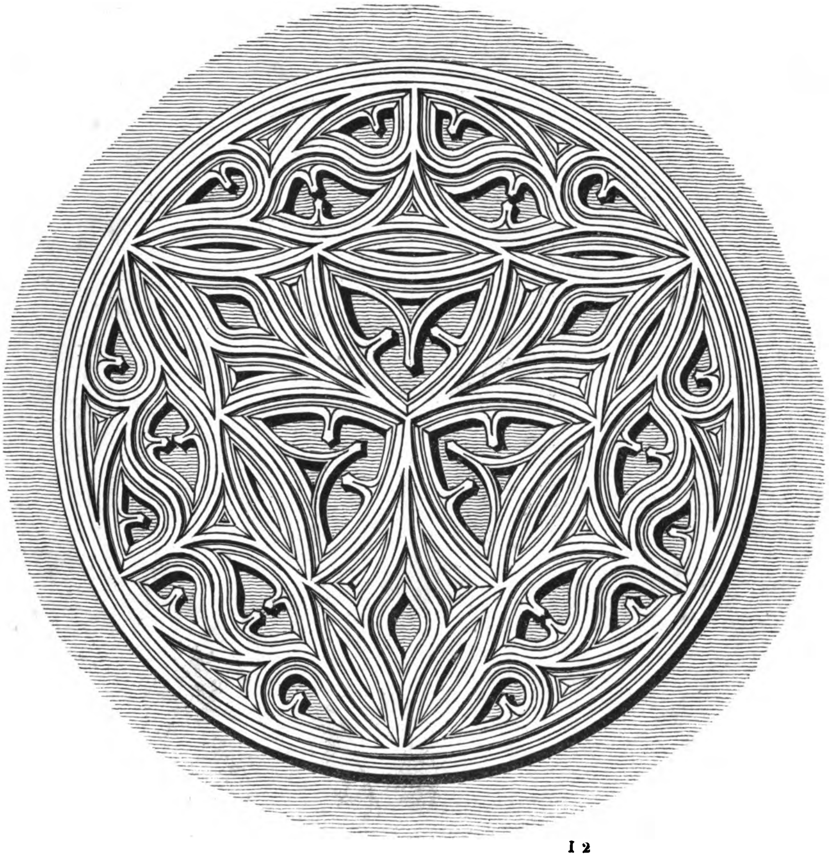


LXXXVIII.

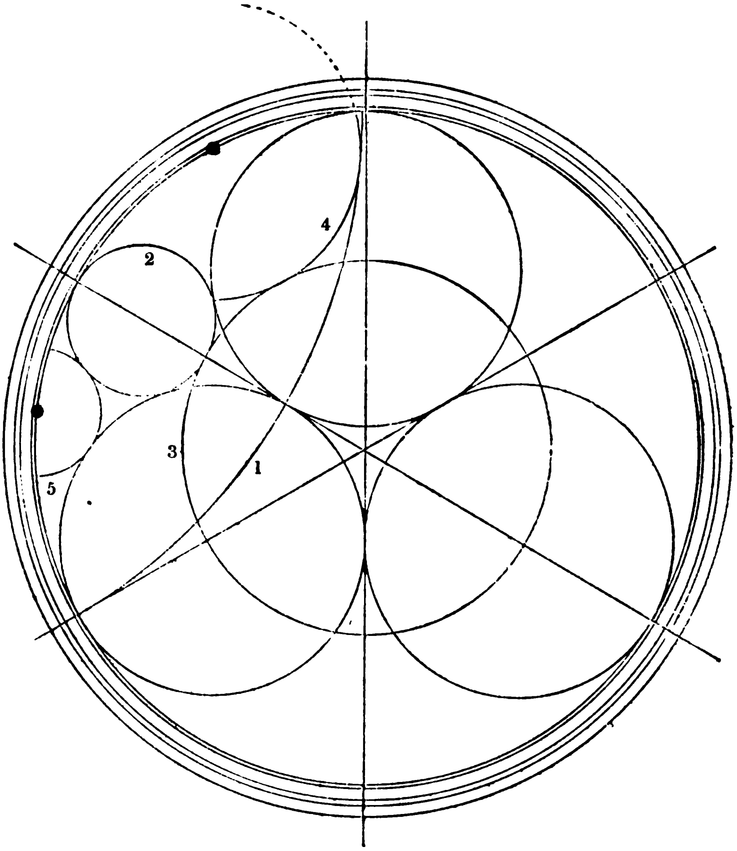


Curves 1, 2, 3, 4, are the same curves, and 5, 6, are also equal.

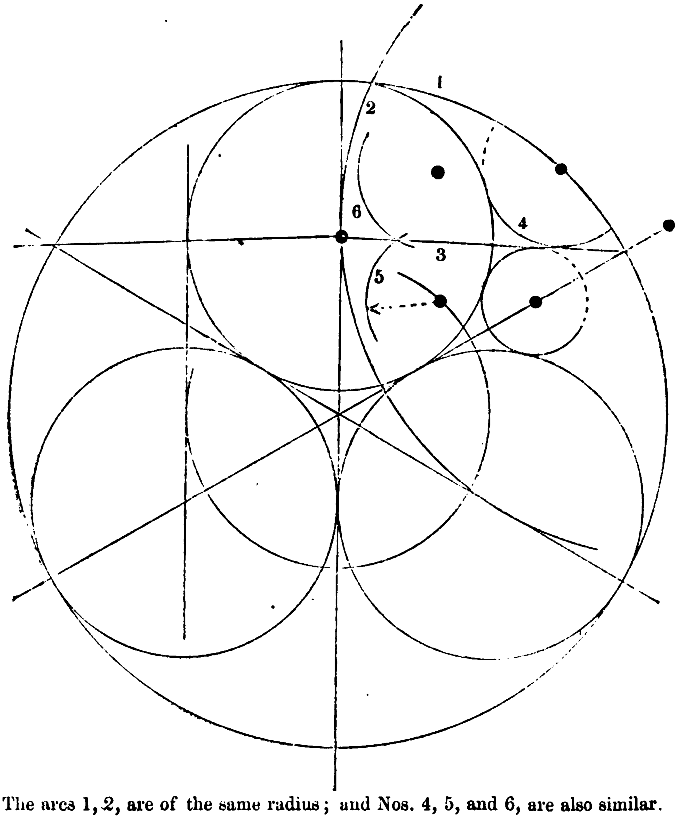




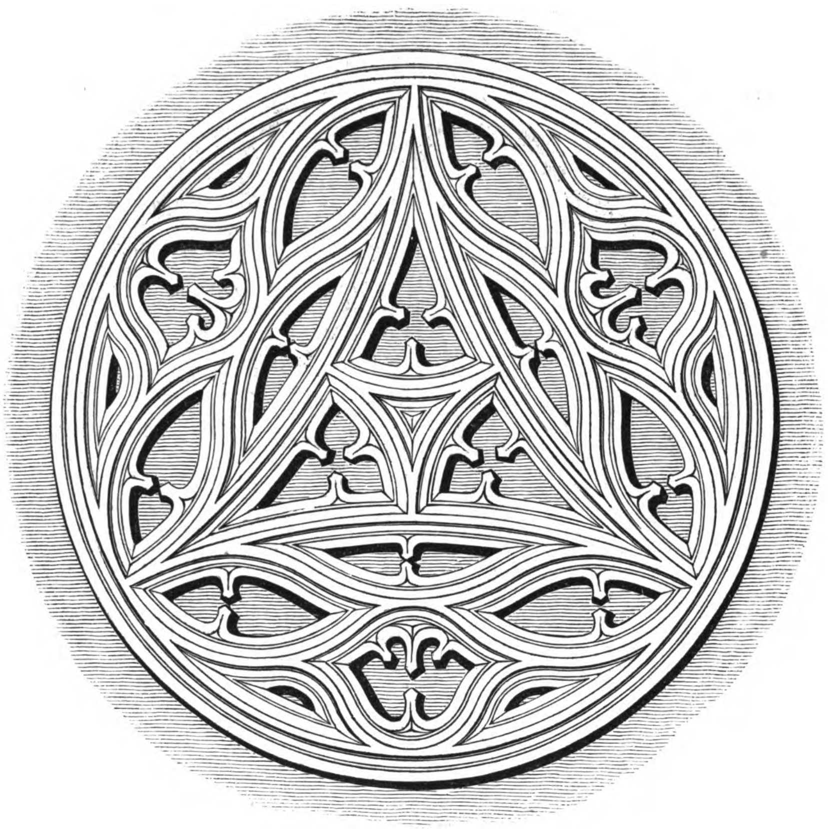
I 2

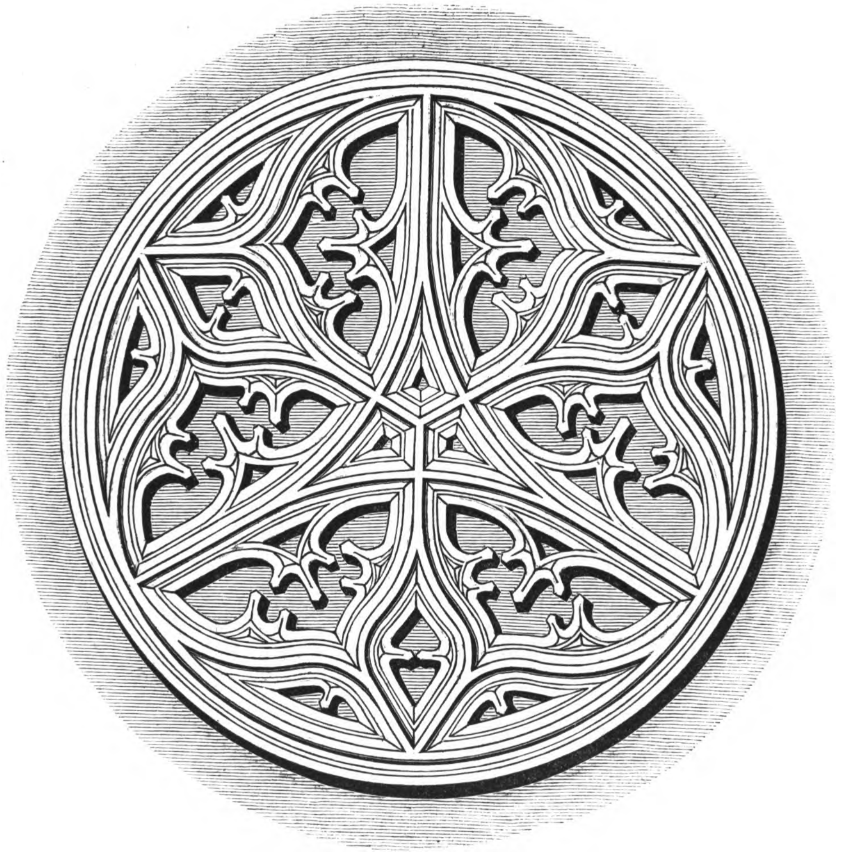


The radius of curve 1 is the diameter of the outer circle.

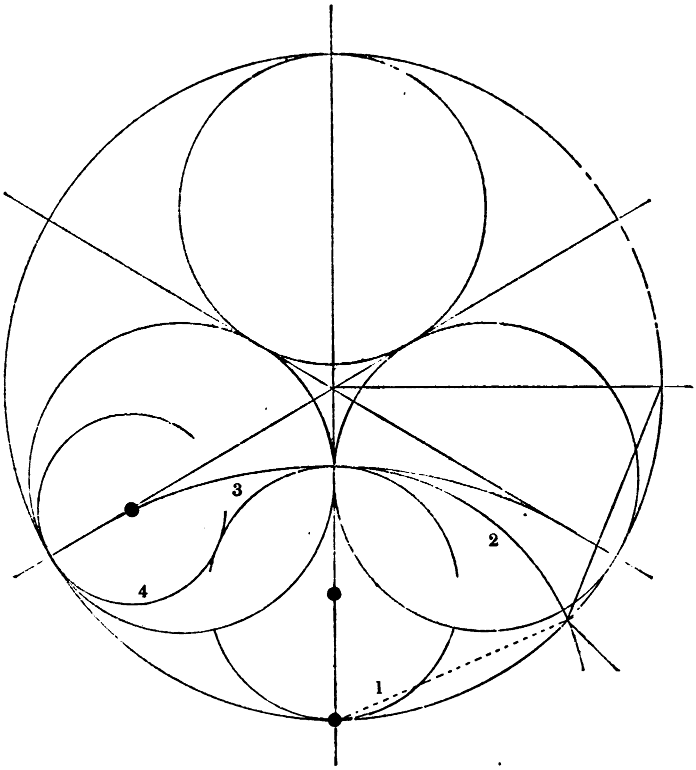


The arcs 1, 2, are of the same radius; and Nos. 4, 5, and 6, are also similar.

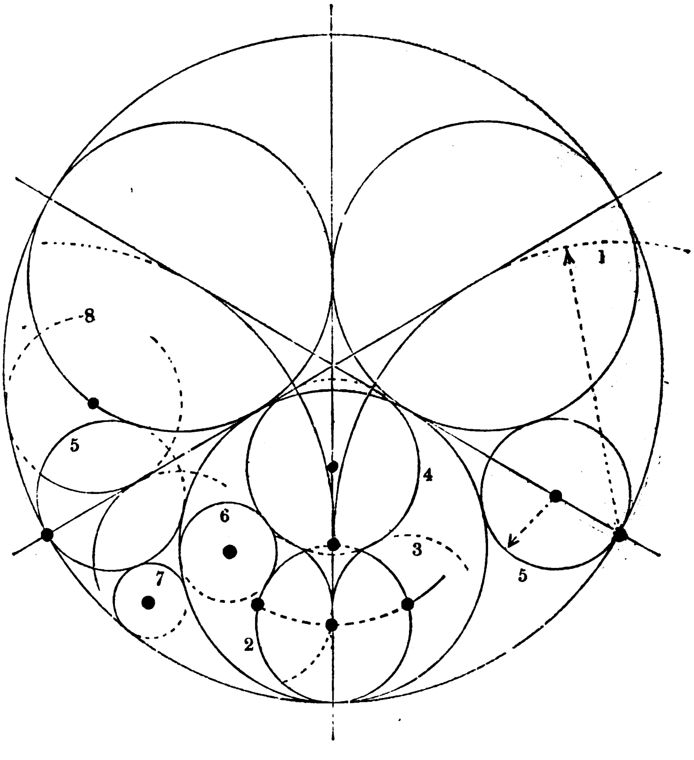


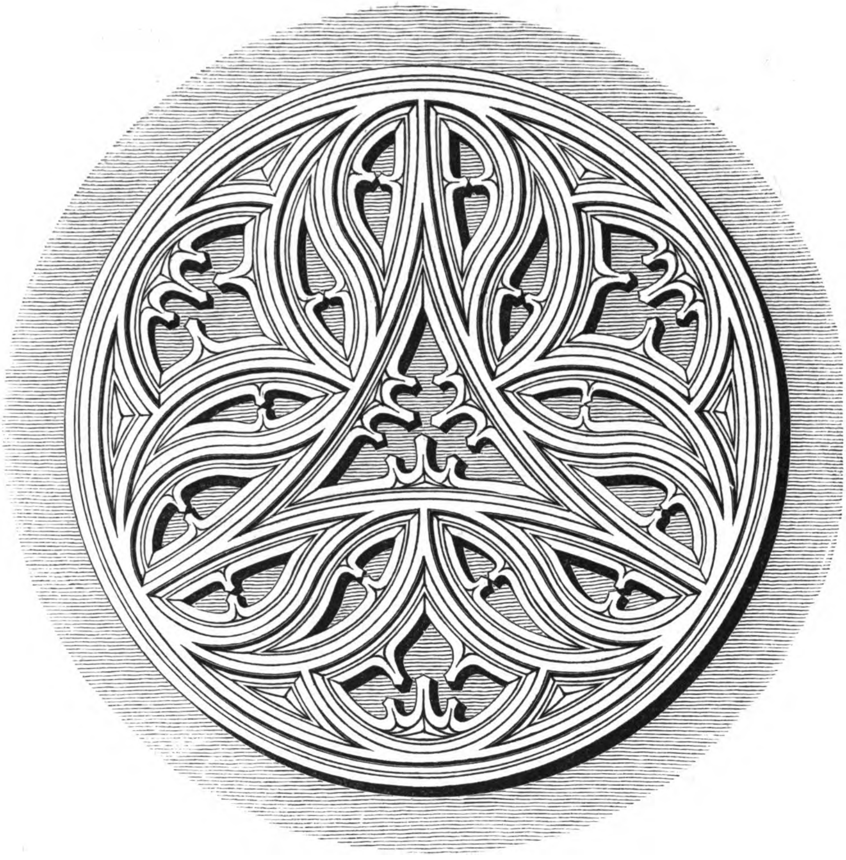


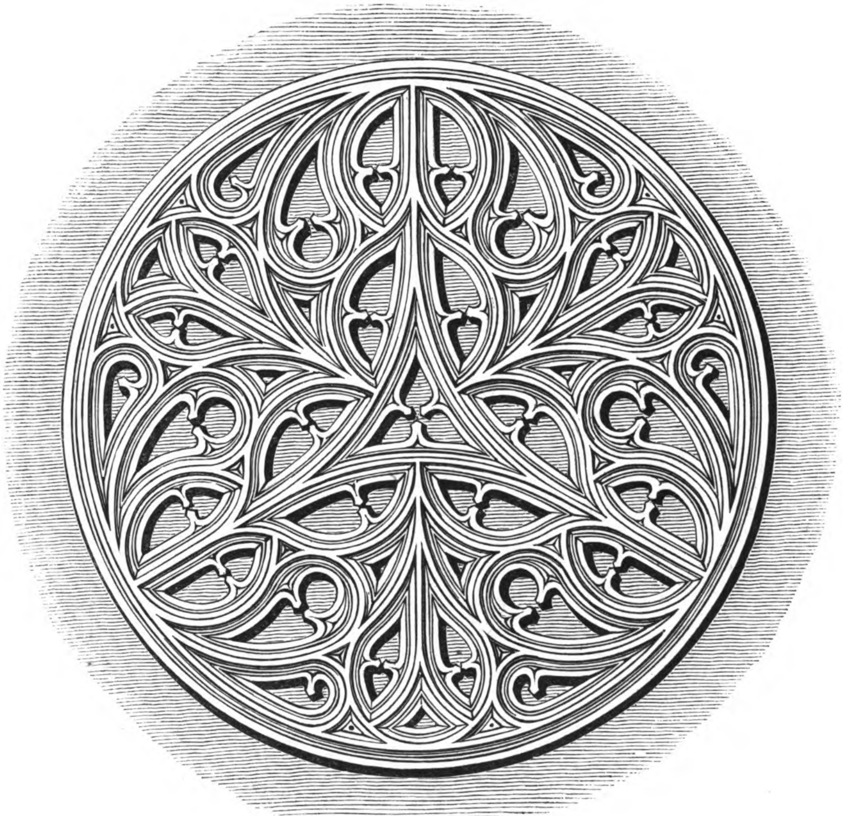
XCI.



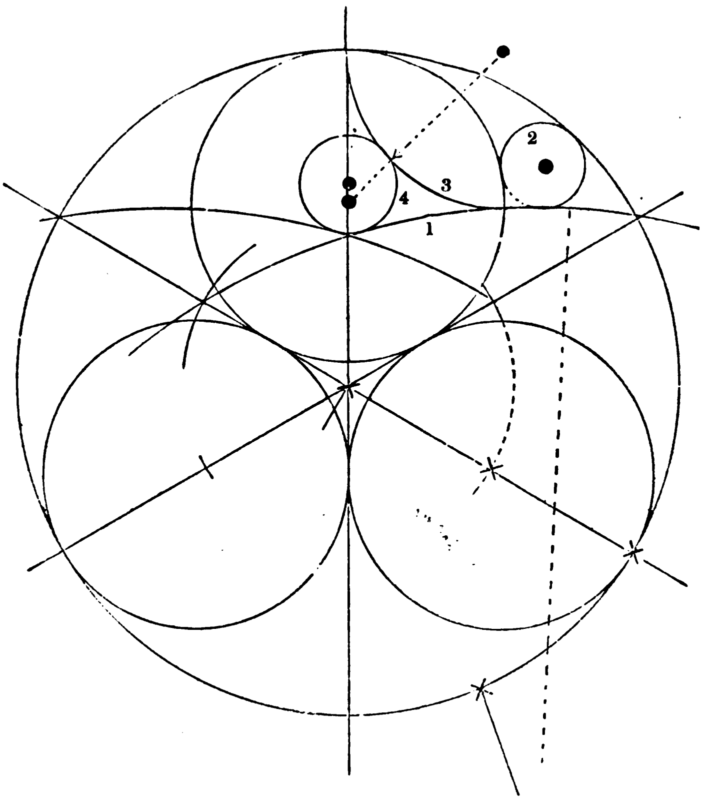
XCII.





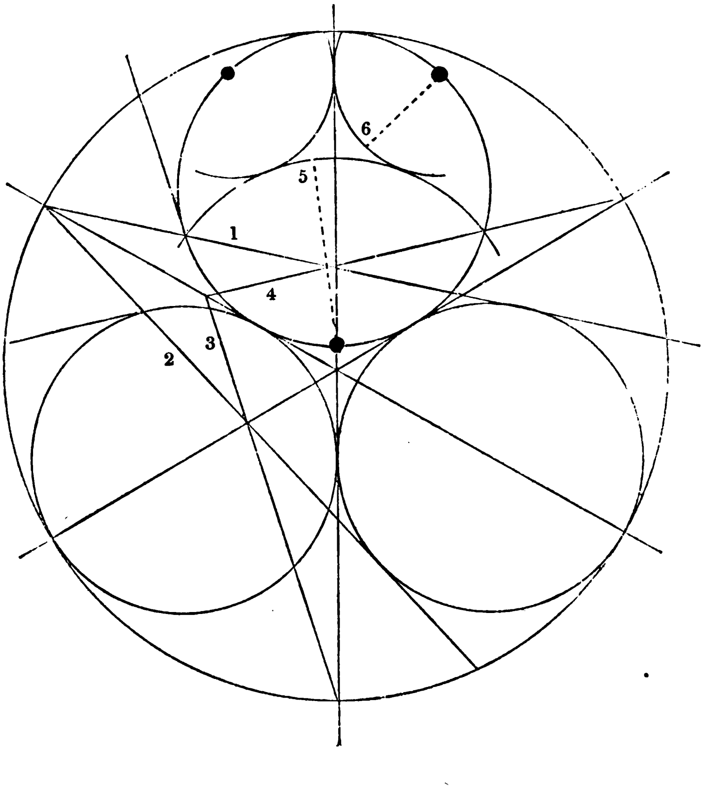


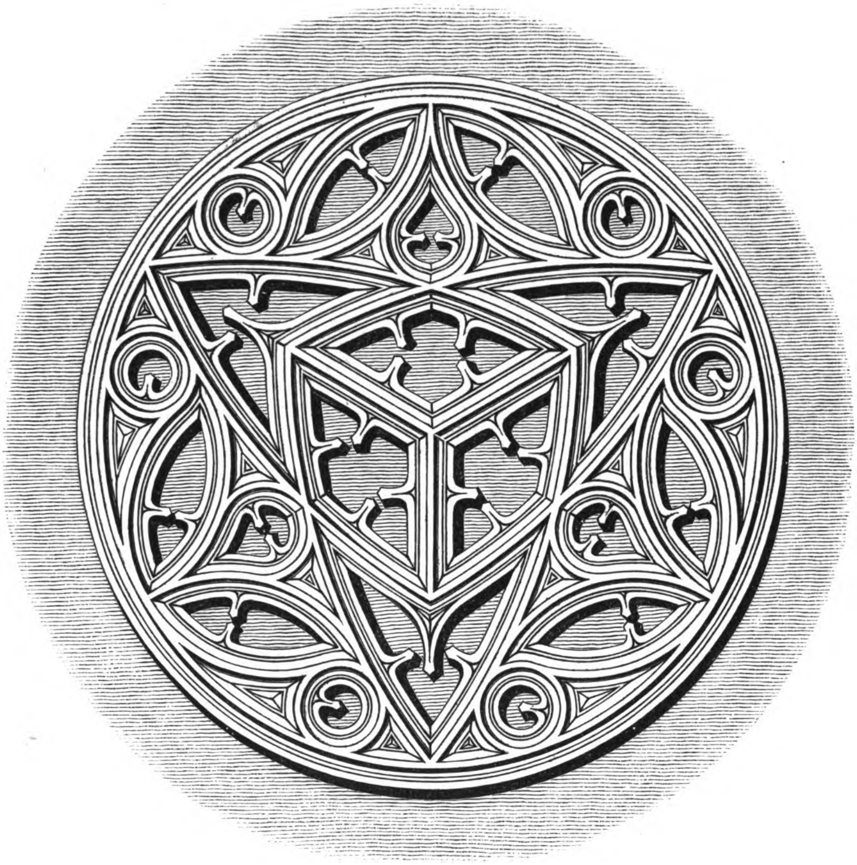
XCIII.

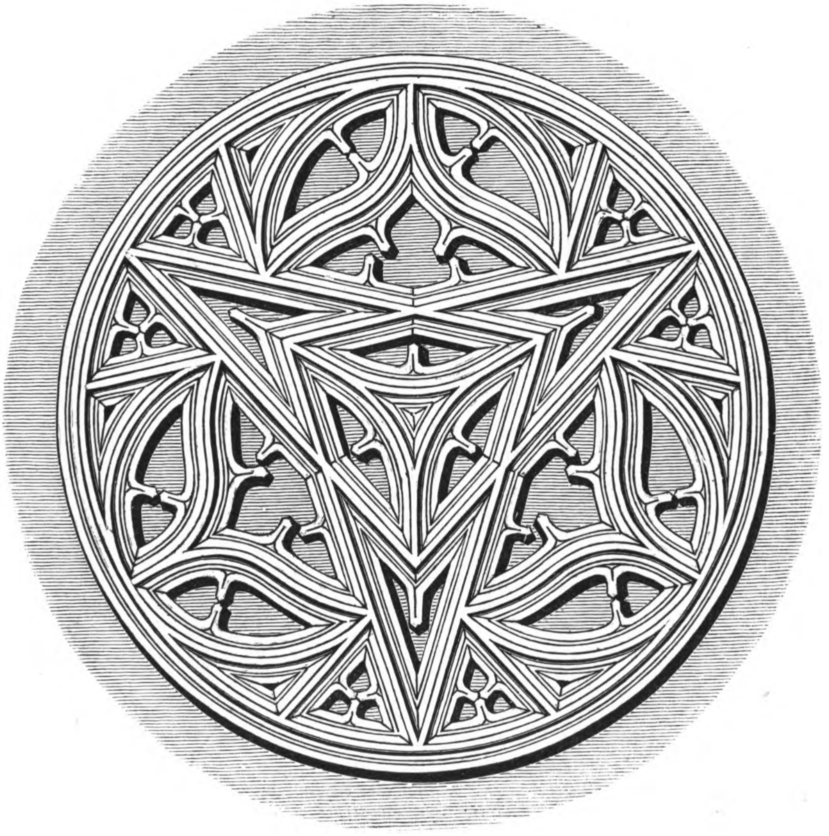


The radius of this curve is the diameter of the outer circle.

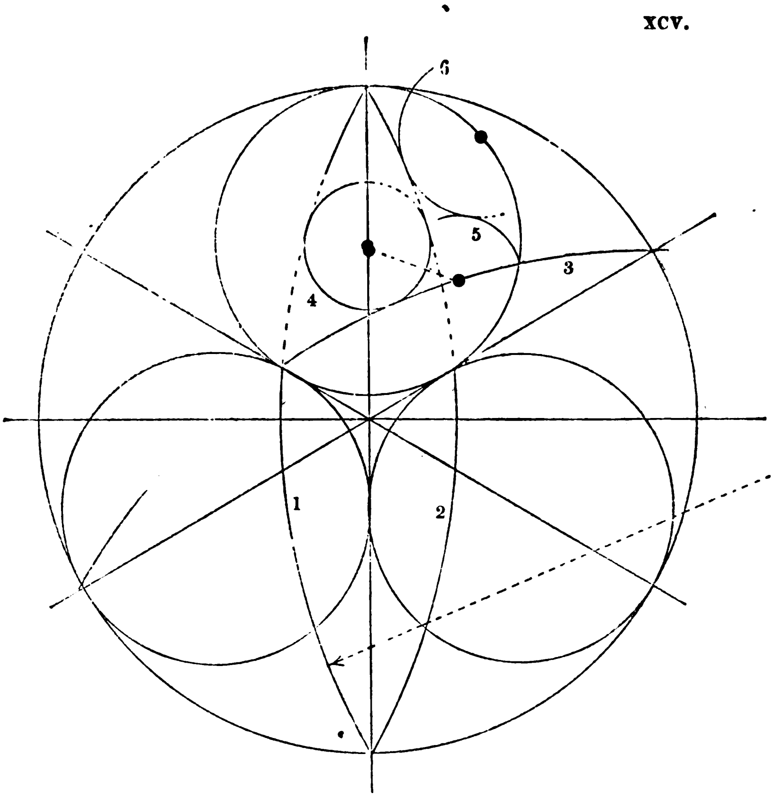
XCIV.





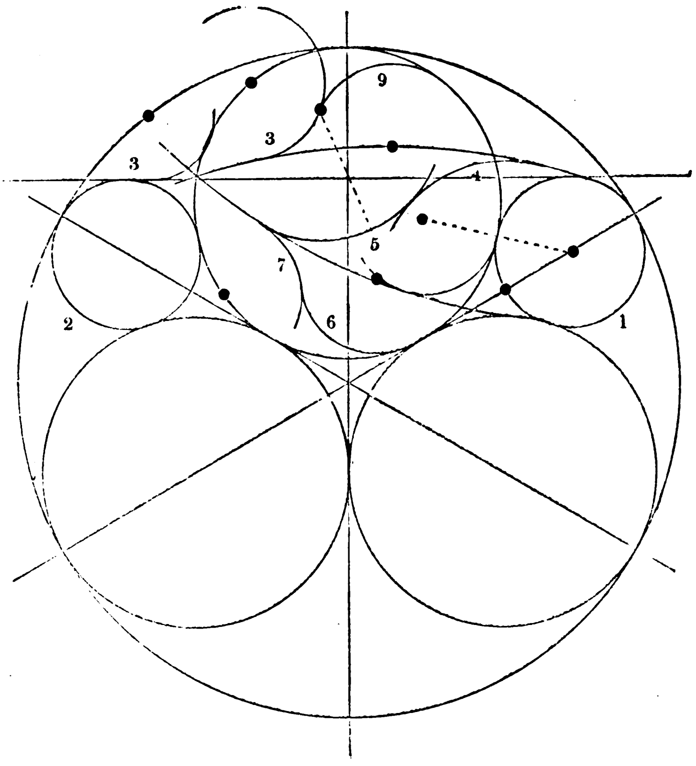


XCV.

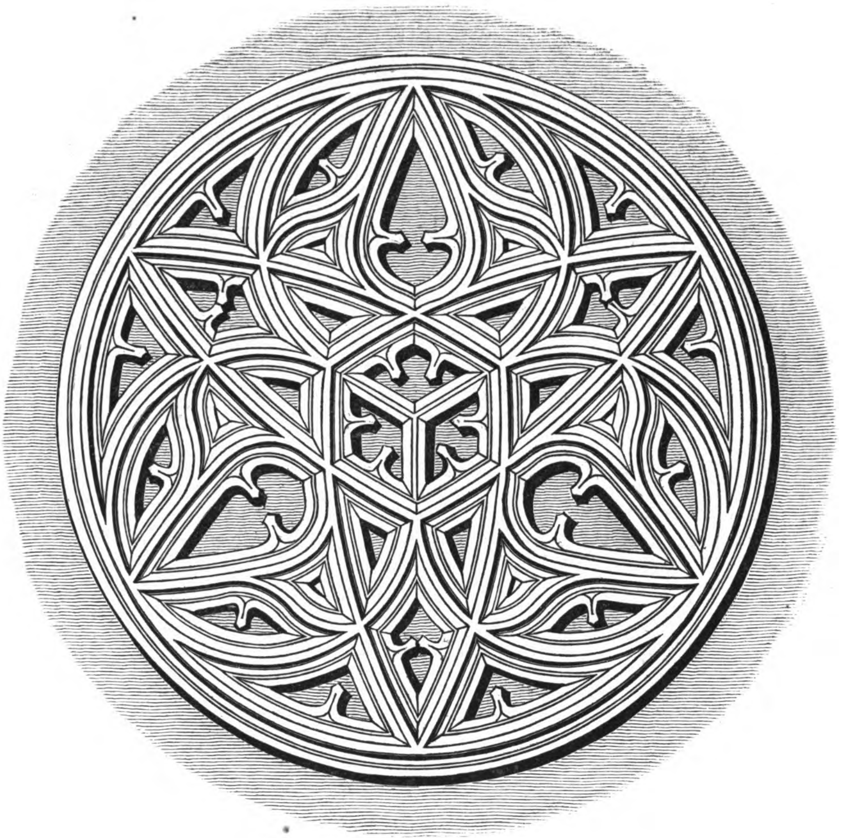


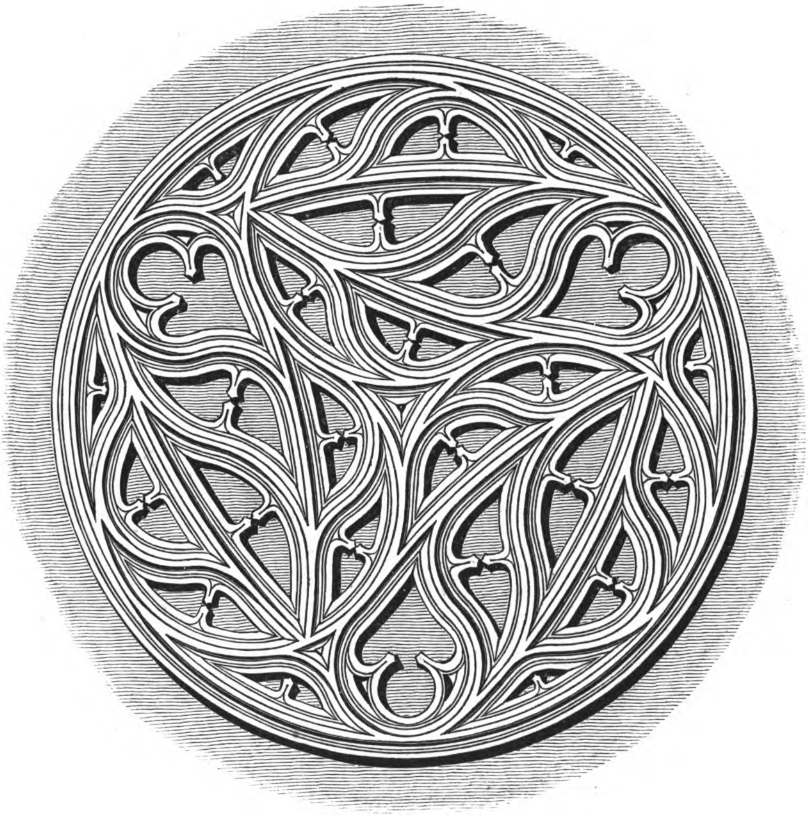
The radius of Nos. 1, 2, 3, is the diameter of the enclosing circle.

XCVI.

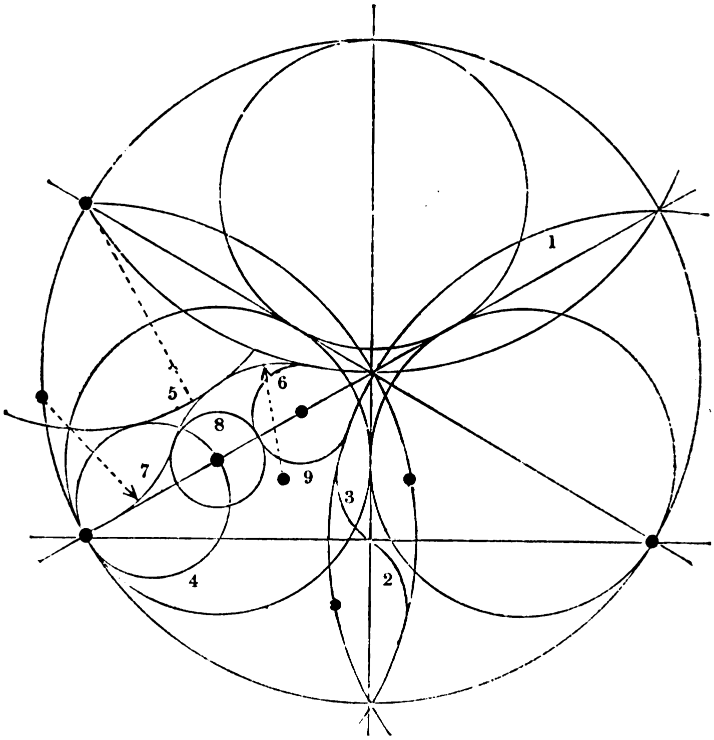


The radius of 3, 3, is the diameter of the outer circle. Nos. 4, 5, are curves of the same radius.

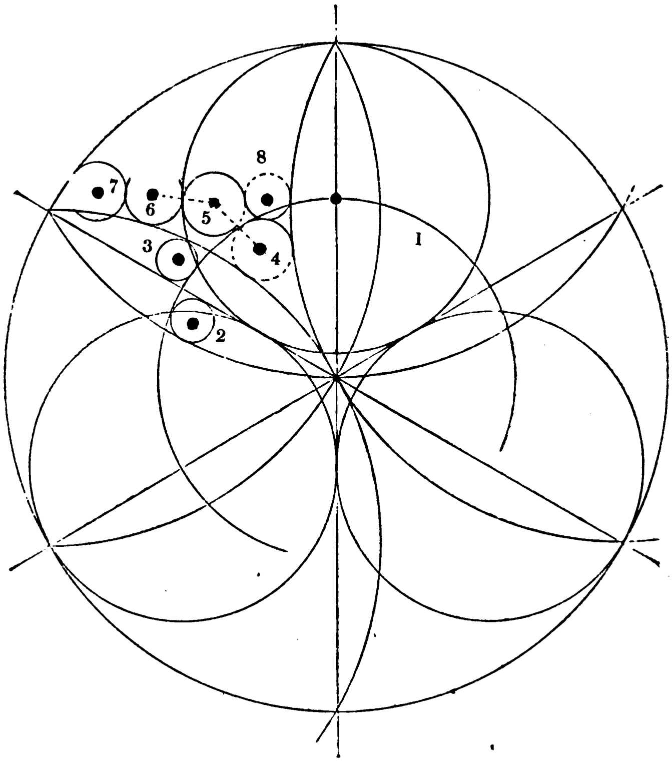




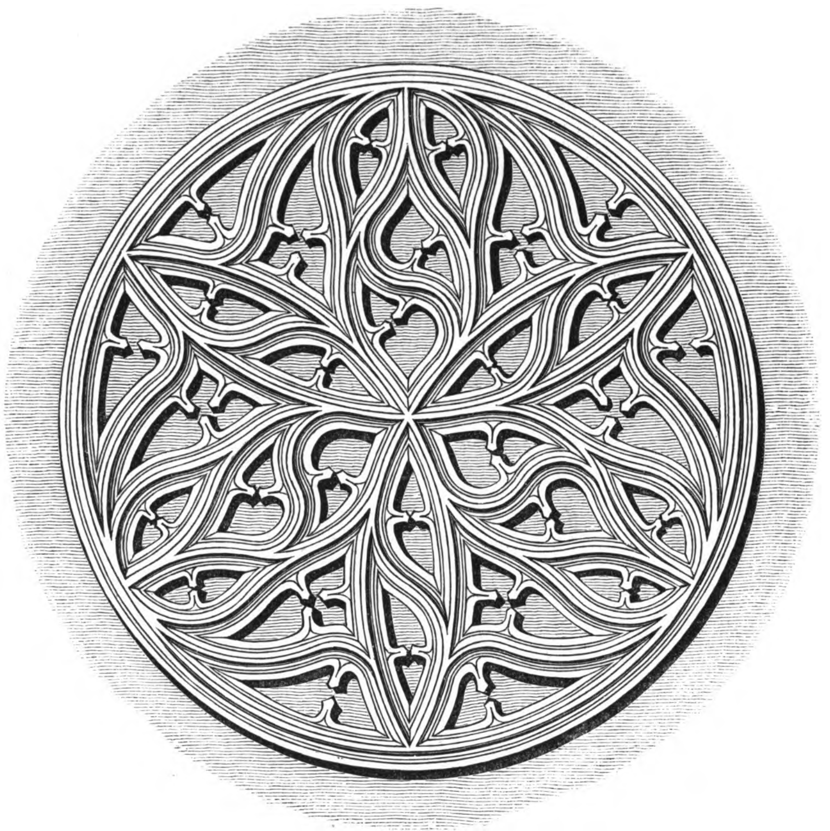
XCVII.

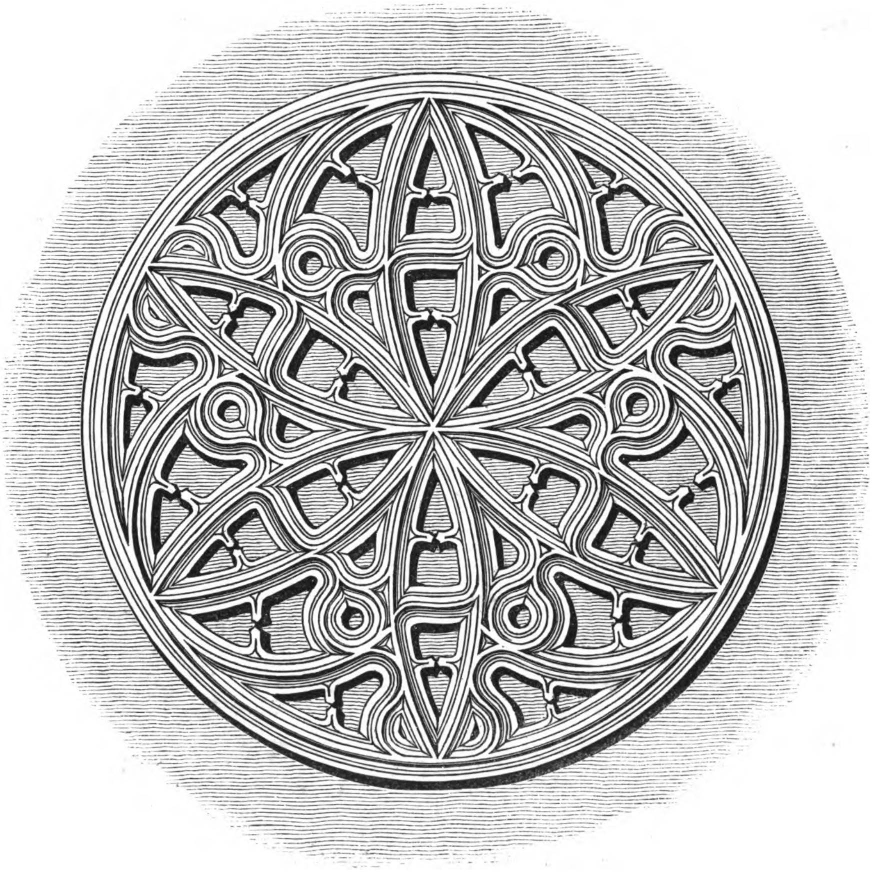


XCVIII.

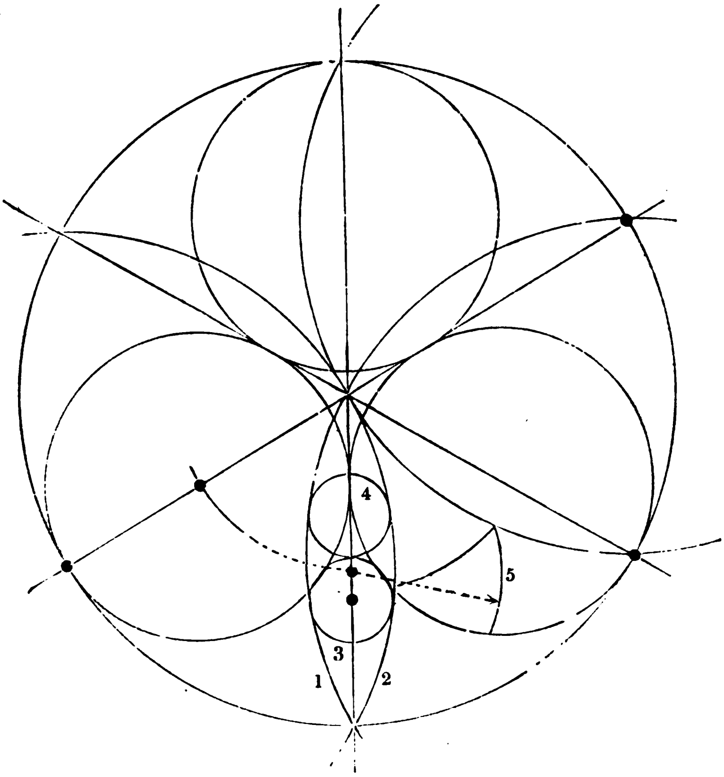


Nos. 4, 5, 6, and 7, are circles of the same size.

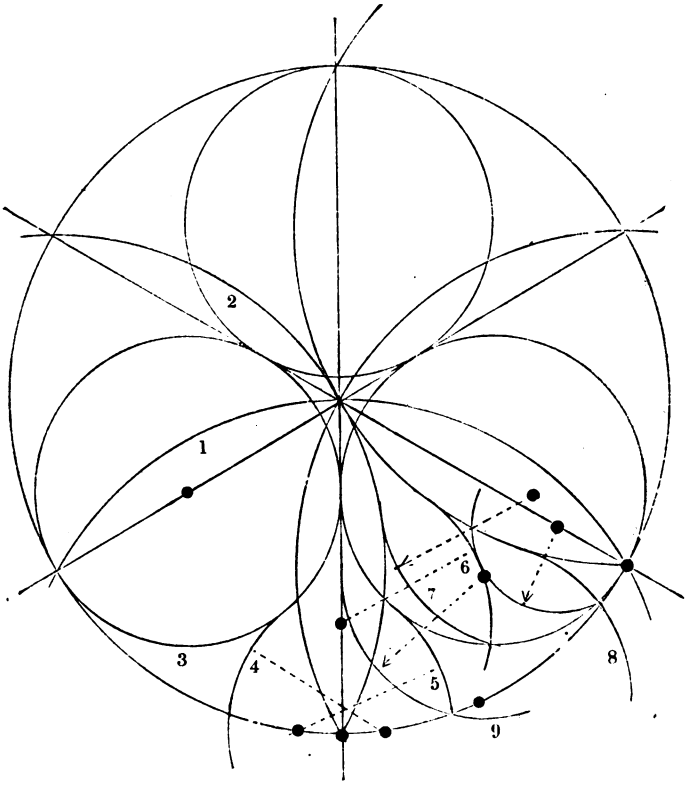




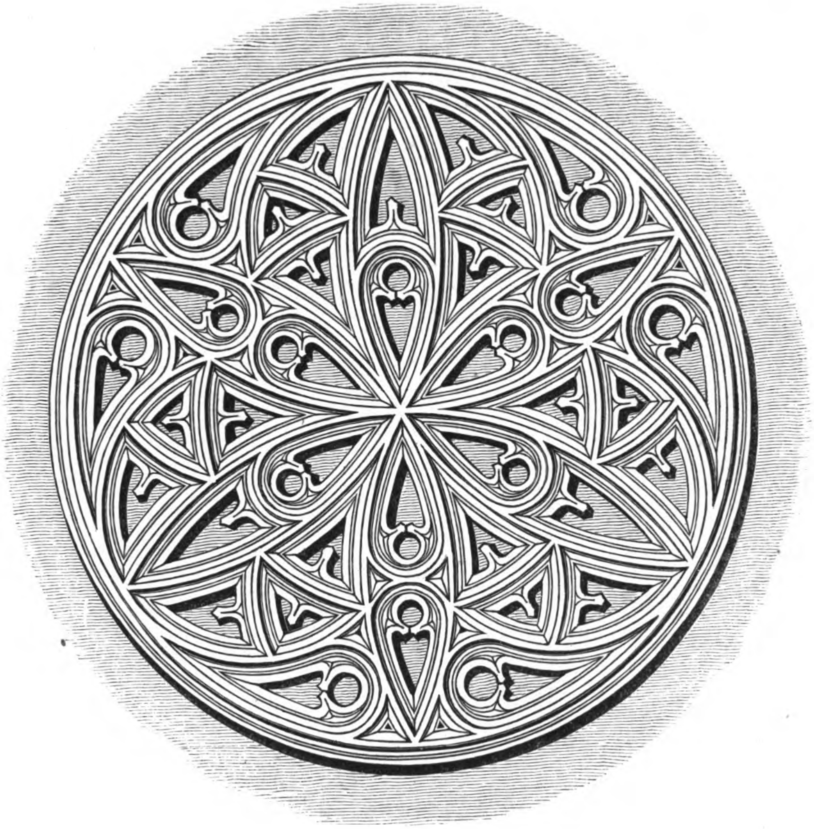
XCIX.

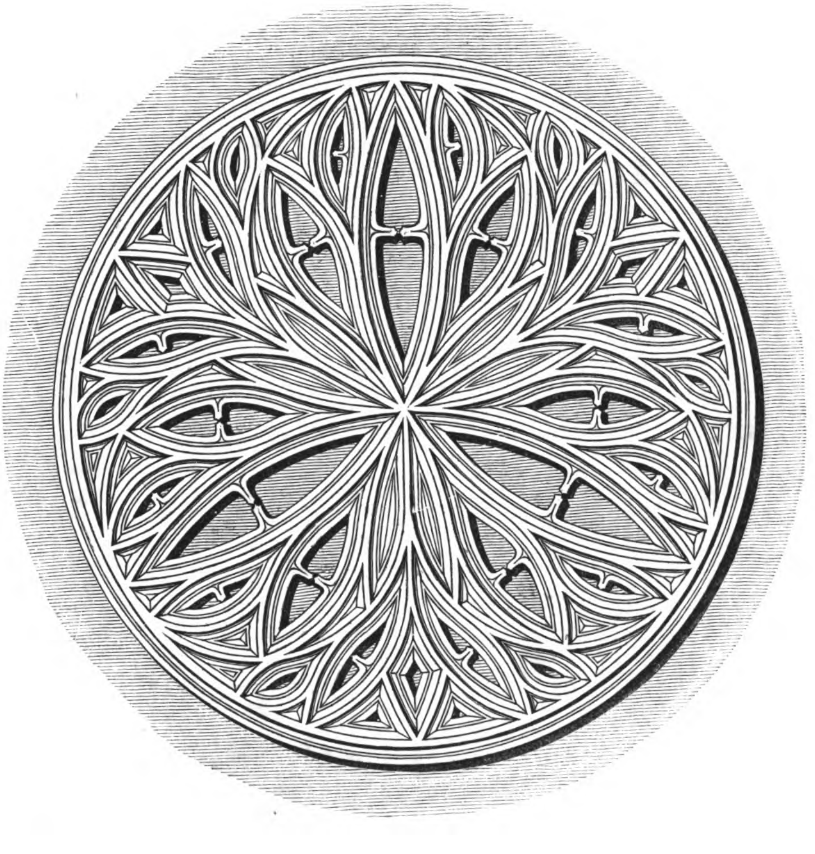


C.



The repetition of one curve may almost be said to form this, our concluding, example for the curves numbered 3, 4, 5, 6, 7, 8, are all of one radius.





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